COMMISSION 27 OF THE I.A.U.

INFORMATION BULLETIN ON VARIABLE STARS

Nos. 701-800

1972 July – 1973 June

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5 January 1973

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NUMBER 701

Konkoly Observatory
Budapest
1972 July 31

MU Cas - NOT AN RRs STAR

30 photoelectric observations (1 P 21, integral light) on July 18 1972 from 22^h08^m to 24^h17^m UT show no variations in excess of 0.02 mag, the difference MU Cas minus comparison star having been constant - 0,27 ± 0.01 mag. For comparison served the star roughly 6' preceding the variable (see chart by ROMANO of GR 13 in Treviso Pubbl. 17,p.40; MU Cas= = S 4672). Thus Lange's statement (Astronomical Circular USSR No. 542), the variability of MU Cas might be of ultra short periodic type, probably is not correct: neither his period (90 min.) nor the amplitude (0.6 mag.) could be verified.

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NUMBER 702

Konkoly Observatory
Budapest
1972 July 31

SPECTRAL CLASS AND METAL-ABUNDANCE INDEX DETERMINATION FOR 20 RR LYRAE STARS AT LIGHT MAXIMUM

The spectral classes of 20 RR Lyrae type stars determined according to hydrogen as well as K(Ca II) lines are given in the Table. The observations were performed with the 70 cm meniscus telescope (dispersion 166 A/mm near Hγ) of the Abastumani observatory. The stars were photographed on A-500 film with the aid of a special camera. The classification was made visually, using the MK standards for A$\overline{\text{V}}$ and F$\overline{\text{V}}$ stars. When classifying, much attention was given to the identity of blackening and quality of the spectra of the stars in question and the standards. The determination of the spectra of the variables was made at their light maxima, since in other phases and especially at minima they were not within the reach of our devices. The analysis of our data shows that during 1 hour near light maximum the change of the spectra is almost unnoticable. Since, our data are reliable in the sense of coverage of the light curve peaks. These conditions are not kept only for TW Lyn. The phases are computed relative to the elements, given in (1), involving refinements on some occasions. Except BB Vir, we have had several negatives for each star. Only the best negatives were used for classification. For SZ Lyn we give the determinations of the spectra not only for the maxima, but also for other phases, in order to state the constancy of the index ΔS within the accuracy of the spectral type estimation. We also give extreme values of RR Lyrae spectra obtained in the course of the same night. In this case the variation of ΔS was observed. In terms of the present and our earlier papers (2,3) we can state that when ΔS varies with the phase it is always less near to maximum and attains the highest value at light minimum. Therefore in such cases the use of mean values of ΔS, which are met in references, seems to be incorrect.

Star	Hel. J.D.	Phase	Exp.	Spectrum H	CaII	ΔS
RZ CVn	2441392.387	0.872	20^m	A8	A1	7
	404	0.902	20	A9	A1	8
	459	0.999	15	A9	A2	7
	41396.392	0.930	15	A9	A1	8
	41421.346	0.908	15	A8	A2	6
	357	0.928	15	A8	A1	7
	369	0.949	15	A9	A2	7
AA CMi	41007.198	0.012	10	A7	A1	6
	207	0.030	15	A7	A0	7
RV CrB	41134.455	0.958	15	F0	A2	8
	467	0.989	15	F0	A2	8
	478	0.023	15	F0	A2	8
	41157.341	0.965	15	A9	A1	8
	41485.398	0.203	20	F0	A2	8
TV CrB	41418.421	0.062	26	A8	A1	7
	41473.377	0.067	26	A9	A1	8
BK Dra	41187.418	0.008	15	A8	A0	8
	430	0.028	15	A8	A0	8
BT Dra	41418.360	0.042	30	A8	A1	7
	41421.407	0.009	25	A8	A1	7
	422	0.038	12	A8	A1	7
SZ Gem	41007.355	0.991	10	A5	A0	5
	372	0.025	10	A5	A0	5
DL Her	41187.248	0.000	20	A6	A0	6
	263	0.025	20	A7	A0	7
SZ Hya	41412.261	0.007	20	A7	A1	6
V LMi	41396.431	0.696	20	A8	A1	7
	439	0.710	20	A8	A2	6
SZ Lyn	41009.250	0.845	10	F1	A9	2
	258	0.911	10	A8	A7	1
	266	0.978	10	A8	A7	1
	274	0.044	10	A9	A9	0
	282	0.110	10	F1	F0	1
	289	0.168	10	F1	F0	1
	41061.230	0.090	10	A7	A7	0
	308	0.737	10	A9	A9	0
TV Lyn	41007.232	0.952	10	A7	A3	4
	239	0.981	10	A7	A3	4
	247	0.014	9	A7	A3	4
	256	0.051	15	A8	A4	4
TW Lyn	41417.229	0.202	30	F6	A6	10
RR Lyr	41213.216	0.801	6.2	F7	A7	10
	224	0.815	6.2	F7	A7	10
	329	0.000	2.5	A8	A2	6

Star	Hel. J.D.	Phase	Exp.	Spectrum H	CaII	ΔS
VY Ser	41425.430	0.996	10^m	F1	A3	8
	448	0.007	10	F0	A3	7
	457	0.020	13	F1	A4	7
AV Ser	41159.272	0.024	20	F0	A2	8
	287	0.055	20	F1	A1	10
ST Vir	41061.354	0.047	10	A6	A1	5
	362	0.066	10	A7	A2	5
				A8	A2	6
AF Vir	41418.393	0.018	16	A7	A0	7
AT Vir	41412.309	0.932	20	A8	A1	7
	323	0.959	20	A8	A1	7
	338	0.988	20	A8	A0	8
	351	0.012	20	A9	A2	7
	41442.308	0.981	15	A7	A0	7
	320	0.010	20	A8	A2	6
BD Vir	41412.388	0.009	15	A8	A1	7

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(2.) Alania I.F.,Abastumansk.astrofiz.obs.Bjull.1968,36,17.

(3.) Alania I.F.,Abastumansk.astrofiz.obs.Bjull.1969,37,39.

June, 1972

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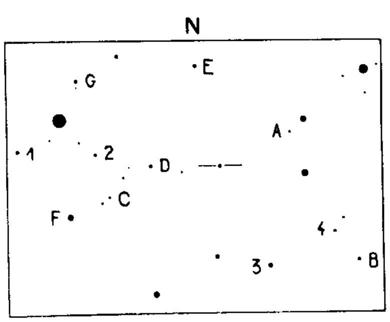
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 703

Konkoly Observatory
Budapest
1972 August 2

VARIATIONS D'ECLAT DE 3C 120

La galaxie de Seyfert 3C 120 (BW Tau) a été photographiée à l'Observatoire de Haute-Provence avec deux télescopes Schmidt de 60 cm (GS) et 30 cm (S) d'ouverture respectivement, sur émulsion IIaO avec un filtre Ilford 805 dont la combinaison donne la magnitude B. Les 23 clichés obtenus ont été mesurés avec le photomètre à iris de l'Observatoire de Meudon.

Les étoiles de comparaison nous ont été obligeamment communiquées par T.D.Kinman et sont représentées dans la figure ci-contre. Les magnitudes des étoiles 1,2,3 et 4 ont été obtenues photoélectriquement et celles des autres étoiles par interpolation photographique. Les étoiles A,B et C nous ont uniquement servi de contrôle et nous avons trouvé pour elles les valeurs 15,71 , 14,42 et 15,37 peu différentes de celles de Kinman. L'erreur quadratique moyenne pour l'ensemble de nos mesures est de 0,08 magnitude.



Etoiles de comparaison

Etoile	Magnitude B	Etoile	Magnitude B	Etoile	Magnitude B
1	14,32	A	15,72	E	15,61
2	15,75	B	14,32	F	14,17
3	15,00	C	15,40	G	14,46
4	15,11	D	15,42		

Magnitudes de 3C 120

N° Cliché	Date TU 1971	B	N° Cliché	Date TU 1971	B
GS 440	Oct. 15,072	14,82	GS 605	Nov. 21,020	14,79
- 564	Nov. 15,052	14,76	- 606	- 21,055	14,76
- 575	- 16,106	14,90	- 610	- 23,026	14,80
- 578	- 17,021	14,96	- 630	Déc. 11,886	14,62
S 4235	- 17,942	14,79	- 631	- 11,910	14,60
- 4236	- 17,954	14,80	- 644	- 12,899	14,42
GS 594	- 18,017	14,57	- 645	- 12,922	14,71
- 595	- 18,040	14,74	- 657	- 13,898	14,60
S 4239	- 18,051	14,82	- 658	- 13,922	14,70
GS 596	- 18,071	14,67	- 681	- 16,010	14,61
- 597	- 18,095	14,88	- 682	- 16,037	14,63
- 598	- 18,129	15,02			

La magnitude a varié irrégulierèment entre les valeurs 14,5 et 15,0. Seule, une augmentation d'éclat de 0,45 magnitude en 2h40min, dans la nuit du 17 au 18 Août, mise en évidence avec six clichés, paraît significative.

Le cliché GS 575 du 16 Novembre a été utilisé par M.-P. Véron pour mesurer la position optique de cette galaxie. Le dépouillement a été effectué en utilisant la méthode de Schlesinger (1), le cliché étant mesuré avec une machine KOMESS-ZEISS. Il a été tenu compte des mouvements propres des étoiles de référence pris dans le Catalogue AGK 3.

La position ainsi obtenue:

$$(1950,0) \quad \alpha = 4^h30^m31,65^s \pm 0\overset{''}{,}5 \qquad \delta = +\,5^\circ14'59,7 \pm 0\overset{''}{,}5$$

est en bon accord avec celle qui a été publiée par Kristian et Sandage (2).

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Observatoire de Meudon

(1) Schlesinger, F., 1926, Astr.J., 37,77.
(2) Kristian, J., Sandage,A.,1970, Ap.J., 162, 391.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 704

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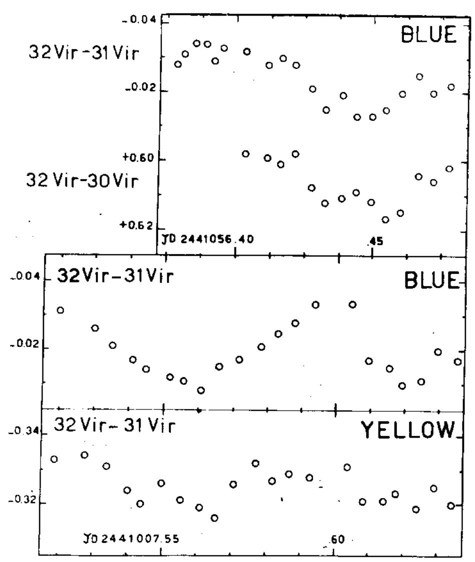
Budapest
1972 August 2

32 VIRGINIS: A PULSATING Am STAR

Breger (1) suggested that pulsation would destroy the metallic-line characteristics.

Bessel and Eggen (2) discovered HR 5491 as pulsating metallic-line star.



Observing with the 60cm telescope and the Lallemand photomultiplier of Bologna Observatory the Am (3) magnetic (4) star 32 Vir for 17 nights, we have found it always pulsating not strictly periodically with a period of about $0^d.07$ and an amplitude ranging from $0^m.02$ to $0^m.05$ as it is shown in the figures. A more detailed paper will follow after new observations in the next spring.

Osservatorio astronomico
dell'Università di Bologna
25 luglio 1972

C. BARTOLINI
F. GRILLI
G. PARMEGGIANI

References:

(1) Breger, M.S., Astrophys.J.Suppl., 18, 167 (1969)
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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 705

Konkoly Observatory
Budapest
1972 August 3

Veröffentlichungen der Remeis-Sternwarte Bamberg
Astronomisches Institut der Universität Erlangen-Nürnberg
Band X, Nr.103

NEW SOUTHERN VARIABLE STARS

On sky patrol plates taken at the Southern Station of the Remeis-Observatory Bamberg at the Boyden Observatory, South Africa and at the Southern Station of the University of Florida Gainesville at the Mount John Observatory, New Zealand, the stars in the following list were found to be variable. None were found to be listed as suspected variables.

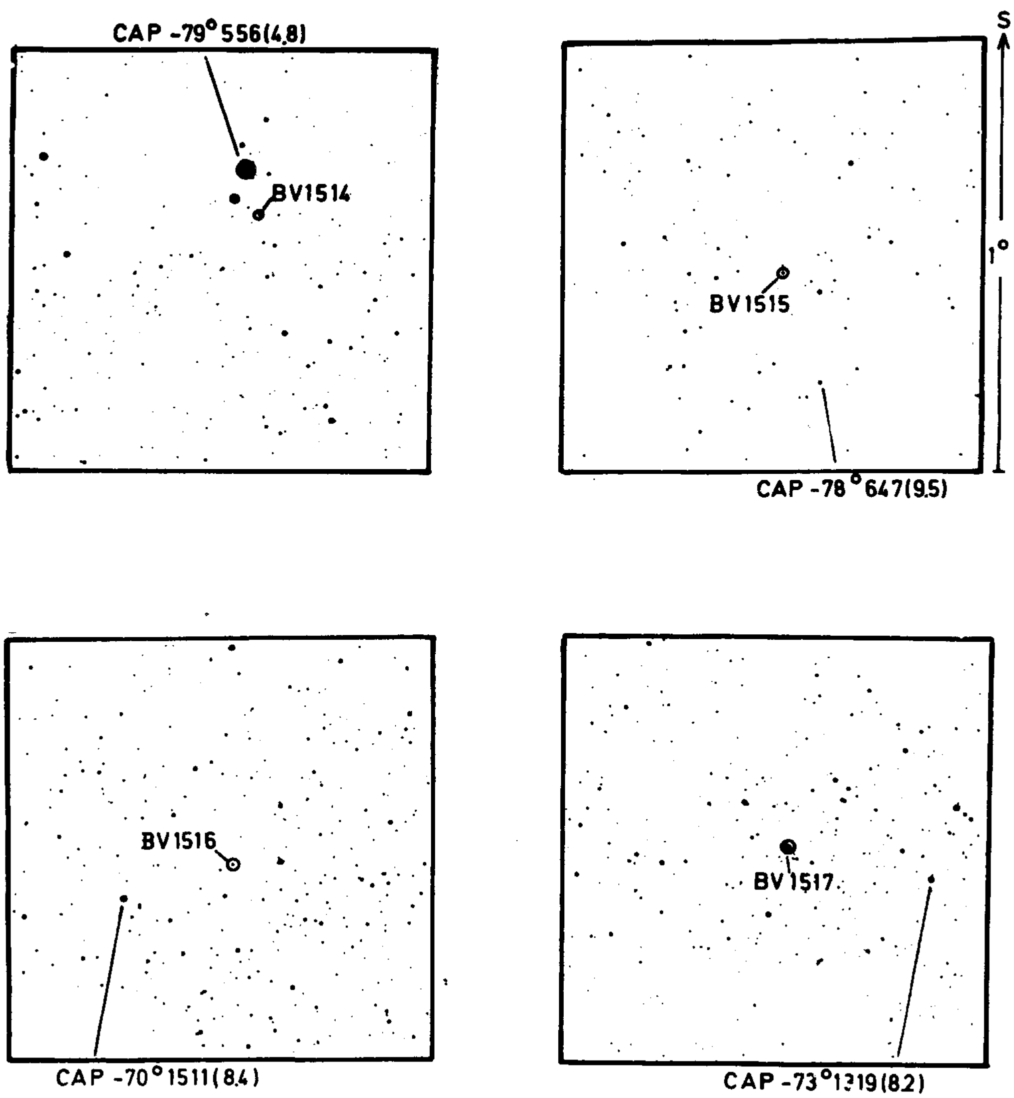
The brightness of these stars at maximum were estimated by comparison with standard stars in the Harvard-Groningen Atlas, Selected Areas (1965, A. BRUN and H. VEHRENBERG).

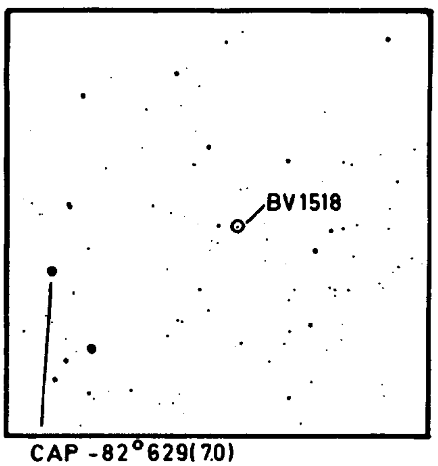
BV-Nr.	RA 1900.0	Dec. 1900.0	max. brightness pg	Ampl.
BV 1514 Cha	$10^h45^m42\overset{s}{.}3$	$-79°54'27"$	$10\overset{m}{.}6$	$0\overset{m}{.}9$
BV 1515 Cha	= CAP $-78°586$ ($9\overset{m}{.}7$)			0.3
BV 1516 Mus	12 40 46.7	-70 32 18	11.7	0.5
BV 1517 Aps	= CAP-73°1302 $8\overset{m}{.}1$ = CoD-73°977 ($6\overset{m}{.}9$) = HD 127369 ($8\overset{m}{.}4$) K5			0.3
BV 1518 Oct	15 00 02.9	-82 51 27	11.3	0.5
BV 1519 Aps	16 31 33.4	-76 36 44	12.0	0.5
BV 1520 Aps	= CAP -75°1408 ($8\overset{m}{.}8$) = CoD-75°1013 ($6\overset{m}{.}5$) = HD 164250 ($9\overset{m}{.}1$) K5			0.3

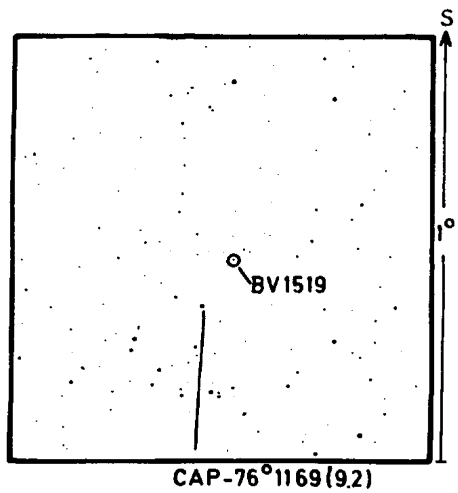
Finding charts are 1° in declination, with south up.

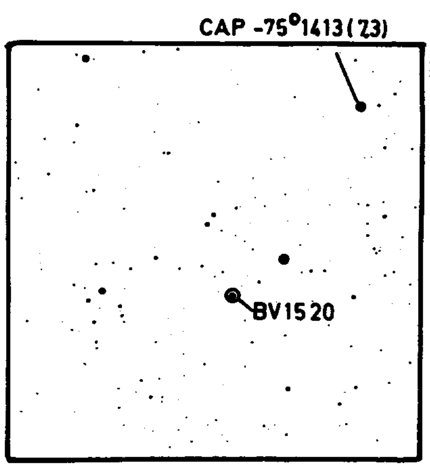
Bamberg, July 1972

D.H. MARTINS
Remeis-Sternwarte Bamberg
and University of Florida
Gainesville


CAP -79° 556(4.8)
BV1514
S
1°
BV1515
CAP -78° 647(9.5)
BV1516
CAP -70° 1511(8.4)
BV1517
CAP -73° 1319(8.2)


BV1518
CAP -82°629(7.0)


S
1°
BV1519
CAP-76°1169(9.2)


CAP -75°1413(7.3)
BV1520

COMMISSION 27 OF THE I. A. U.
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Konkoly Observatory
Budapest
1972 August 4

PHOTOELECTRIC UBV MEASURES OF NOVA CEPHEI 1971

The early decline stage of Nova Cephei 1971 was observed by us in the UBV system on 14 nights in July, August, and September 1971. Our equipment consisted of a single-channel photometer with refrigerated 1P21 photomultiplier, a direct-current amplifier, and stript-chart recorder at the Cassegrain focus of the 132 cm telescope of The University of Michigan.

The values obtained are presented in Table I. An average of 9 standards was observed each night; about half of the standards each night were taken from among the brighter stars in NGC 7160 with values obtained from Hoag, et al.(1961).The mean standard deviations in the least squares fits for the standards are ±0.025, 0.016, 0.021 mag. in V, B-V, U-B,respectively. Extinction coefficients were determined on most of the nights; in the column labelled "Extinction" in Table I "n" indicates that a nightly extinction value was used and "m" that a mean value was applied. All observations of the nova were made between 1.019 and 1.088 air masses.

Table I

1971 U.T.Date July	V	B-V	U-B	Extinction	1971 U.T.Date Aug.	V	B-V	U-B	Extinction
14.28	8.21	0.51	-0.44	m	05.29	9.31	0.62	-0.55	m
.29	8.23	.51	- .43	m	.37	9.43	.66	- .53	m
.38	8.33	.52	- .42	m	06.22	9.55	.63	- .54	n
15.29	8.42	.60	- .46	m	.31	9.55	.64	- .58	n
16.25	8.46	.60	- .46	n	07.23	9.88	.62	- .55	n
.34	8.50	.61	- .45	n	12.25	10.25	.51	- .59	m
20.26	8.65	.65	- .49	n	16.23	10.68	.45	- .39	m
.34	8.63	.64	- .49	n	18.31	10.64	.42	- .35	n
21.29	8.68	.67	- .50	n	Sep.				
.36	8.73	.68	- .55	n	22.13	11.26	.33	- .34	n
27.27	9.35	.63	- .55	n	24.18	11.47	.28	- .26	n
.35	9.37	.63	- .54	n					

The light-curve in V would be classed as fast/moderately fast according to Payne-Gaposchkin (1957) and has similarities to that of XX Tauri. We are unaware of further photoelectric observations of Nova Cephei 1971 other than those reported here and in I.A.U. Circulars No. 2343, 2351, and 2353.

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Hoag, A.A., Johnson, H.L., Iriarte, B., Mitchell, R.I.,Hallam, K.L., and Sharpless, A. (1961) Publ.U.S.Naval Obs. Vol.17,Part 7, 474.

Payne-Gaposchkin, C. (1957) "The Galactic Novae" (Amsterdam: North-Holland Publ. Co.),pp. 12, 24.

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NUMBER 707

Konkoly Observatory
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1972 August 9

THE OBSERVATION OF A STELLAR FLARE IN
THE dM5 STAR ROSS 128

We report the observation of a probable stellar flare at 0558 U.T., 1972 May 12, in the dM5 star Ross 128 (Gliese 447 (1), Yale 2730 (2), Eggen 212 (3)). The flare was fortuitously recorded in the U filter-band during routine photoelectric monitoring of the star, and we show the UBV observations plotted against time in Figure 1. The flare is only marginally evident in the B and V observations but is clearly indicated in the U observations. Each U observation shown in Figure 1 is the resultant of 8 individual star and 7 individual sky measures, and in Figure 2 we show, versus time, the individual (star-sky) deflections which compose the U = +13.82 mag observation shown in Figure 1 at t = 44.0 min. The integration time for each star/sky measure was 15 sec. The flare is clearly time-resolved in Figure 2, and there seems to be little question as to its reality. It would appear that peak light occurred between the star measures at t = 150 sec and t = 192 sec in Figure 2.

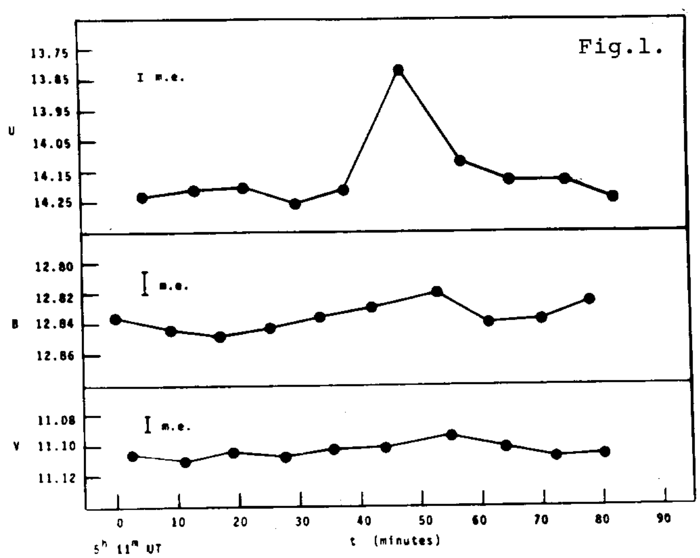
Fig.1.
13.75
13.85
13.95
14.05
14.15
14.25
U
I m.e.
12.80
12.82
12.84
12.86
B
I m.e.
11.08
11.10
11.12
V
I m.e.
0
10
20
30
40
50
60
70
80
90
5^h 11^m UT
t (minutes)

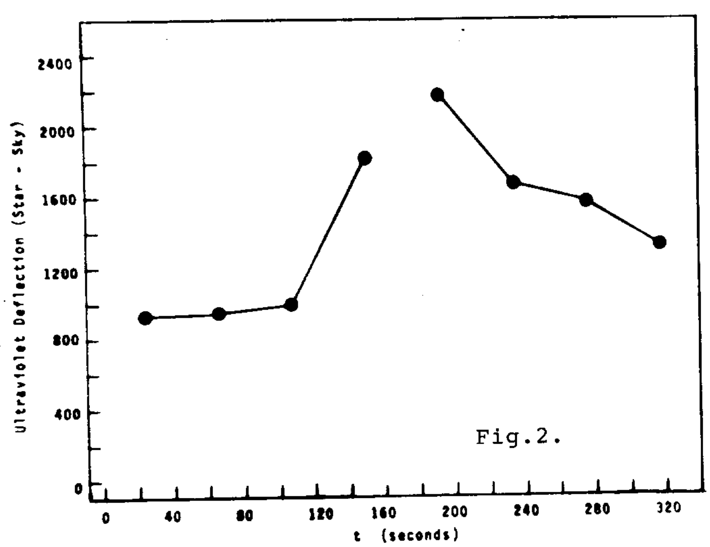
Fig.2.
2400
2000
1600
1200
800
400
0
Ultraviolet Deflection (Star - Sky)
0
40
80
120
160
200
240
280
320
t (seconds)

These observations were made with the NASA 60-inch telescope at the Catalina Observatory of the Lunar and Planetary Observatory, University of Arizona, on a night of excellent photometric quality. Prior and subsequent photometric monitoring of this star by the authors has not revealed the occurrence of other flare events.

Ross 128 is not a known flare star (4), and we urge that further monitoring be undertaken in order to substantiate the occurrence of stellar flaring in this object. There is reason to believe that Ross 128 is an evolutionary "old" object. Kinematically Eggen (3) has classed Ross 128 as an old disk population object; although its space velocity vectors (UVW) = (+2,+27,+1 km sec^{-1}) do not render such classification clear-cut. The star is subluminous in the M_V,R-I and M_R,R-I planes (3,5), a characteristic of halo and some old disk population M dwarfs. Four old disk population flare stars have been recognized (6): Bd +43°44 A and B, SZ UMa and Wolf 630, of which, however, only BD +43°44 B is significantly subluminous in the M_V,R-I and M_R,R-I planes (3,5). Stellar flares have not been substantiated as occurring in the halo population M dwarfs; although van de Kamp (7) reports the possible occurrence of a flare in a late-type companion to the well-known halo population subdwarf Grmb 1830. Stellar flares are usually associated with extreme evolutionary youth and/or pre-main-sequence contraction, and it is thus not clear what the occurrence of flares in presumably evolutionary old objects may imply. The discovery and study of flares in such objects is thus of considerable interest.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 708

Konkoly Observatory
Budapest
1972 August 11

OBSERVATIONS OF THE PECULIAR EMISSION OBJECT HBV 475

On 4 plates of the Tautenburger Felderplan the object could be found on the borders of the field.

2 further plates, got by F. Börngen in July 1972 were specially centered on the object.

The following table gives the results of determination of magnitudes in system B using the comparison stars b,c, d and g published in Information Bulletin on Variable Stars Nr. 384. The object continues to decrease in magnitude.

Plate	Author	Date	JD	m (B)
1739	K.Löchel	1964 Sep. 8/ 9	2438 647.395	12.3
1749	K.Löchel,Börngen	" " 12/13	651.444	12.4
1755	K.Löchel,Börngen	" " 13/14	652.468	12.1
1763	K.Löchel	" " 14/15	653.413	12.2
3476	Börngen, Lochno	1972 Jul. 4/ 5	2441 503.501	12.7.
3490	Börngen	" " 6/ 7	505.465	12.5

17,July 1972

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Karl-Schwarzschild-Observatorium
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DDR

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 709

Konkoly Observatory
Budapest
1972 August 15

VARIABLE COMPACT GALAXY OR SUPERNOVA
IN A COMPACT GALAXY

The compact galaxy at

R.A.= 22^h17^m3, Decl.= $+08^\circ35'$ (1950)

has on two different nights the following apparent magnitudes:

September 21,1952 $m_v=17.4$ $m_p=17.9$
July 30,1954 $m_v=17.0$ $m_p=17.7$

This compact galaxy has a faint halo. The spectrum of the system is now being checked by professor Oke with his scanner at Palomar and direct pictures are being taken by one of our students with the 48-inch Schmidt.

As I mentioned at Brighton it will be important to observe the brighter variable compact galaxies (like 1 Zw 1) as often as possible with small telescopes. When an outburst occurs stations with large telescopes should be informed immediately, so that spectra can be obtained which will enlighten us about the phenomena involved.

August 10, 1972

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 710

Konkoly Observatory
Budapest
1972 August 19

PHOTOELECTRIC SECONDARY MINIMA OF AK Her

Differential photoelectric observations of AK Her were made by Bookmeyer (1) on 28 May 1966 at Kitt Peak National Observatory. We have obtained the times of heliocentric secondary minima via the method of Kwee and Van Woerden (2). The light elements given by Binnendijk (3)(I) and Kurutac and Ibanoglu (4)(II) were used to determine O-C's for both yellow and blue observations.

AK Her

Pri. Min: JD 2436757.6601 ± 0.42152502.E (I)

Pri. Min: JD 2438531.4318 ± 0.42152309.E (II)

Secondary Minima	Error	Phase	Color	O-C	Elem.
JD 2439274.79119	±0.00018	0.4868	Y	-0.0056	I
.79075	±0.00015	0.4858	B	-0.0060	I
.79110	±0.00018	0.5079	Y	+0.0033	II
.79068	±0.00017	0.5069	B	+0.0029	II

Evidently, the elements II are to be preferred.

Department of Physics,
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August, 1972

DAVID J. KILLIAN
TERRY W. EDWARDS

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 711

Konkoly Observatory
Budapest
1972 August 31

PHOTOMETRY OF V1216 SAGITTARII

During the recent International Co-operative Flare Star period from the 3rd to 17th July, 1972, observations were made on V1216 Sgr with the 41cm Reflector at Boyden Observatory, The detector was a cooled EMI 6256A photomultiplier tube fitted with a standard Johnson B filter. The table gives details of the observations over a total monitoring time of 24^h42^m.

Three flares were observed during this period, two of them being minor flares. Unfortunately adverse weather conditions prevented more observations.

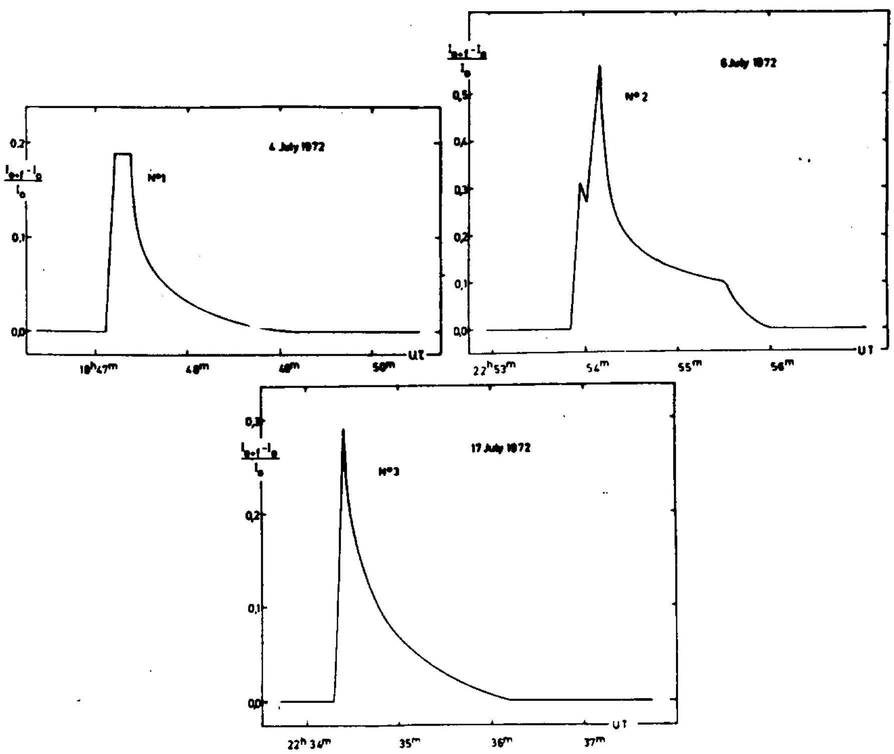
The time interval between flares 1 and 2, viz. $48^h6^m.8$ possibly provides some more evidence for the 48^h interval previously reported for this star (Andrews 1966 and Jarrett and Eksteen 1969).

Monitoring Data for V1216 Sgr

July 1972		Total Hours per Night	Flare No.	UT of Flare	Duration (mins.)	$\frac{I_{o+f} - I_o}{I_o}$
3	17^h18^m - 19^h47^m	4^h32^m				
	20 02 - 22 05					
4	17 25 - 20 53	5 22	1	$18^h47^m.10$	2.10	0.19
	21 02 - 22 07					
	22 14 - 23 03					
5	17 22 - 21 10	3 48				
6	18 39 - 19 03	3 20	2	22 53.85	2.15	0.56
	19 20 - 20 56					
	22 37 - 23 57					
11	17 08 - 20 10	3 02				
17	16 51 - 19 38	4 38	3	22 34.3	1.9	0.29
	22 01 - 23 52					
	Total	24^h42^m			Mean	0.35

Note: I_o is the intensity deflection (less sky background) of the quiet star.

I_{o+f} is the total intensity deflection (less sky background) of the star plus flare at maximum.



A.H. JARRETT and J.P. EKSTEEN

Boyden Observatory,
Department of Astronomy,
University of the Orange Free State,
Bloemfontein.
Republic of South Africa.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 712

Konkoly Observatory
Budapest
1972 August 31

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STARS
BD+13°2618 and BD+16°2708

Continuous photoelectric monitoring of the flare stars BD+13°2618 and BD+16°2708 has been carried out at the Stephanion Astronomical Station (λ=-22°49'44", ϕ=+37°45'15")during the period May 7-14, 1972 using the 30-inch Cassegrain reflector of the Department of Geodetic Astronomy, University of Thessaloniki. Observations have been made with a Johnson dual channel photoelectric photometer in the B color of the international UBV system. The telescope and photometer will be described elsewhere. Here we mention only that the transformation of our instrumental ubv system to the international UBV system is given by the following equations:

$$V=v-0.001(b-v)+2.040,$$
$$B-V=0.844+1.031(b-v),$$
$$U-B=-1.182+0.966(u-b).$$

The monitoring intervals in UT as well as the total monitoring time for each night are given in Table I. Any interruption of more than one minute has been noted.

During the 9.45 hours of monitoring time of the star BD+16°2708 one flare was observed. Only one flare was also observed during the 12.44 hours of monitoring time of the star BD+13°2618. The characteristics of these two flares are given in Table 2. For each flare following characteristics (Andrews et al.1969) are given: a) the date and universal time of flare maximum, b) the duration before and after maximum (t_b and t_a respectively) as well as the total duration of the flare, c) the value of the ratio $(I_f - I_o)/I_o$ corresponding to flare maximum, where I_o is the intensity deflection less sky background of the quiet star and I_f is the total intensity deflection less sky background of the star plus flare, d) the integrated intensity of the flare over its total duration, including pre-flares.

if present, $P=\int(I_f - I_o)/I_o dt$, e) the increase of the apparent magnitude of the star at flare maximum $\Delta m(b)=2.5\log(I_f/I_o)$, where b is the blue magnitude of the star in our instrumental system, f) the standard deviation of random noise fluctuation $\sigma(mag)=2.5\log(I_o+\sigma)/I_o$ and g) the air mass. The light curves of the observed flares in the b color are shown in Figs. 1-2.

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July 31, 1972

G. ASTERIADIS and L.N. MAVRIDIS

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TABLE 1

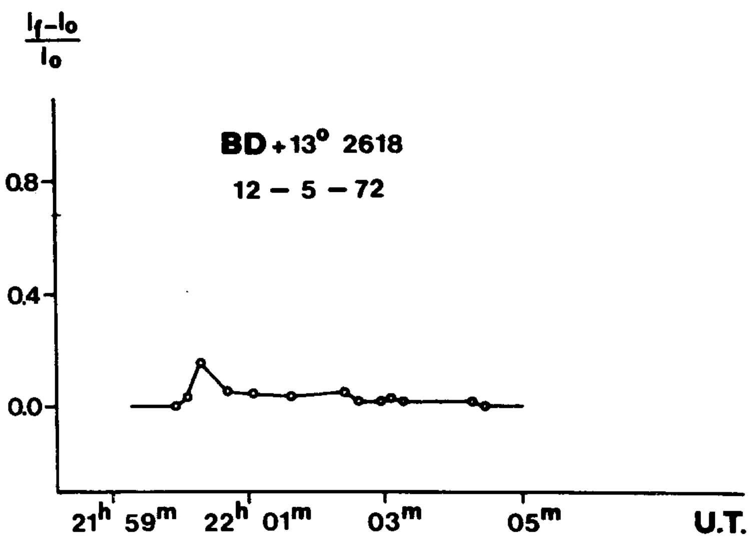
Monitoring intervals(UT)

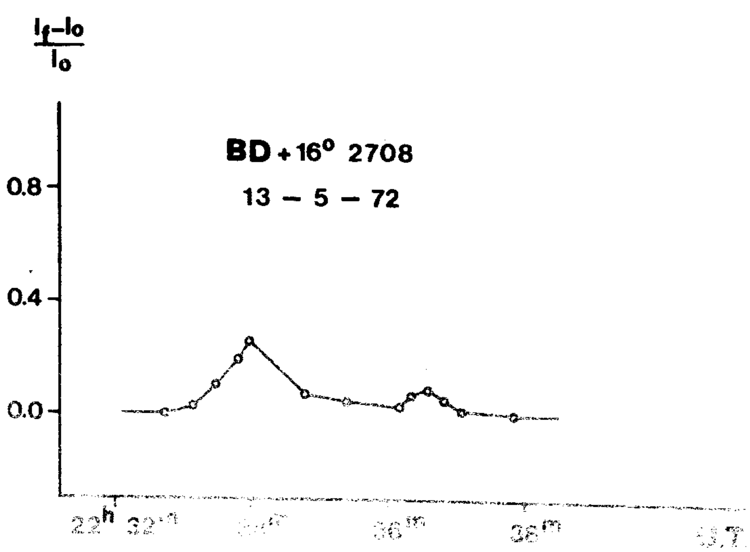
Star	Date 1972 MAY	Monitoring intervals	Total Monitoring Time
BD+16°2708	7-8	20^h46^m-20^h54^m, 2056-2109, 2112-2138, 2140-2206,	
		2212-2243, 2245-2313, 2315-2336, 2342-2345,	
		2347-0013, 0015-0042, 0044-0115, 0117-0200,	4^h43^m
	11-12	2324-2331, 2344-0007, 0009-0028.	49^m
	13-14	1923-1936, 1937-1957, 1958-2040, 2045-2202,	
		2204-2302, 2304-2340, 2357-0044, 0046-0106	4^h13^m
		Total	9^h45^m
BD+13°2618	9-10	2059-2122,2124-2156, 2157-2226, 2231-2301,	
		2303-2330,2333-2358, 0000-0005, 0007-0011,	
		0017-0031,0034-0102, 0103-0158.	4^h32^m
	11	1953-2022, 2024-2053, 2055-2127, 2133-2147,	
		2203-2230, 2232-2300, 2304-2307.	2^h42^m
	12-13	1941-2007, 2008-2035, 2037-2103, 2106-2150,	
		2202-2300, 2304-0000, 0007-0059, 0104-0145.	5^h30^m
		Total	12^h44^m

TABLE 2

Characteristics of the flares observed

Star BD	Date 1972 May	UT max.	t_b min.	t_a min.	Duration min.	$\frac{I_f - I_o}{I_o}$ max.	P min.	Δm mag.	σ mag.	Air Mass
$+13^{\circ}2618$	12	$22^h00^m.3$	0.4	4.0	4.4	0.15	0.17	0.15	0.01	1.24
$+16^{\circ}2708$	13	$22^h34^m.0$	0.5	4.9	5.4	0.26	0.38	0.25	0.01	1.09





COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 713

Konkoly Observatory
Budapest
1972 September 11

OBSERVATIONS OF THE EXTREMELY YOUNG
STELLAR GROUP Lk Hα 224 AND 225

The evolutionary significance of the stellar group near BD + 40°4124 was first noticed by Herbig (ApJ Supp. 4, p.337). Later Cohen (ApJ 173, L 61) and Strom et al. (ApJ 173, L 65) detected large infrared excesses of members of the group. Furthermore the data of Strom et al. revealed some optical variability of Lk Hα 225 and of BD + 40°4124 itself.

Though the remark of Strom et al. on the strong variability of Lk Hα 225 seemed not to be conclusive, as they compared the red photograph of Herbig (l.c.) with their own blue plates, a private communication of Dr. Herbig satisfied the doubts.

I estimated the stars Lk H_α 224 and 225 on Sonneberg plates with the following results:

Lk Hα 224 is more often bright than faint. In maximum light there are irregular fluctuations generally between 13.^{m}0 and 14.^{m}0 (cycle length roughly 50 days) which occasionally are interrupted or terminated by minima (extreme case: 17.^{m}3) lasting days or weeks.
Total range: 12.^{m}6 to 17.^{m}3 pg.

Lk Hα 225 is usually fainter than 16.^{m}5 and invisible on the majority of plates. A series of Heidelberg 40 cm astrographic plates from 1958 April to July shows the star irregularly varying between 17.^{m}0 and 17.^{m}8 near the plate limit. On the POSS prints the object is about 16.^{m}8 (O 754) and 17.^{m}8 (O 1145), Strom et al. measured B = 18.2 (1971 Oct. 14). The outstanding fact is that two eruptions are observed:

1962 June 2, Oct. 4	15.^{m}4	(May 31 fainter than 16.^{m}0),
1963 Sep. 13	15.7	(isolated plate).

Total range: 15.^{m}4 to 18.^{m}2 pg.

W. WENZEL

Sternwarte Sonneberg
DDR-64

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 714

Konkoly Observatory
Budapest
1972 September 12

THE R-I COLOR OF V 1057 CYGNI BEFORE THE OUTBURST, AND ITS BRIGHTNESS AND SPECTRAL CHANGES

As announced in my "Preliminary Note on V 1057 Cygni and Some Other Similar Objects" (Haro 1971), we have at the Tonantzintla Observatory two direct plates obtained in succession the night of November 24, 1965, in red and near infrared emulsions (Eastman Kodak 103aE and IN plates behind Wratten filters No. 29 and No. 89b, respectively), centered approximately near V 1057 Cyg.

At my request, Dr. T.A. Lee kindly obtained the B, V, R and I photoelectric magnitudes of the Be star Lk Hα 192 that is located very near V 1057 Cyg and in the same obscured area. The results from two independent measures of Lk Hα 192, made on June 15 and 16, 1972 by Dr. Lee, are as follows:

$B = 15.62, \quad V = 14.33, \quad R = 12.99, \quad I = 11.4$

Altough the lower precision in the I magnitude quoted above was emphasized in Dr. Lee's private communication, we can be rather confident in the approximate value of R-I=+1.5 for Lk Hα 192, which obviously indicated a very high reddening for a Be type star.

This particular photometry and Andrews' (1970) red photographic photometry in Orion allowed me to determine the R and I magnitudes of V 1057 Cyg as it was on November 24, 1965. A simple inspection of the Tonantzintla plate collection on Cygnus evidences that the blue photographic magnitude of V 1057 Cyg was before the outburst systematically at least half a magnitude fainter than Lk Hα 192 and that the R-I color undoubtedly was larger for the first star than for the second. Below are the quantitative R and I values derived for V 1057 Cyg and its R-I color:

$$R = 12.7, \quad I = 10.9, \quad R\text{-}I = +1.8$$

According to Rieke, Lee and Coyne (1972), the R and I magnitudes of V 1057 Cyg on the 12th of March, 1971 were:

$$R = 8.13, \quad I = 6.92$$

As it can readily be noticed, the R-I color of V 1057 Cyg was conspicously larger before the outburst than after it. Obviously, I made a mistake in my Preliminary Note (IBVS No. 565) when stating that the near infrared color of V 1057 Cyg was larger after than before the "slow flare-up".

Several astronomers have suggested that there was not an intrinsic change in the luminosity and spectral type of V 1057 Cyg, and that the clearing of a dense inner shell or circumstellar envelope has been responsible both for the optical variation and dissipation of the veiling that masked the real spectral type of this particular star which was of an early type before the outburst.

Now we can present some additional arguments in favor of our original ideas of an intrinsical change in the star itself: a) Although the near infrared color was larger before than after the outburst and this can be taken, at least partially, as a consequence of a clearing or dissipation of a dust shell, it can also be interpreted as caused by the real transit of an advanced T Tauri star of G-K spectral type that has passed through a severe change in temperature and spectrum. If that is the case, the high value of R-I =+1.8 before the outburst can mainly be taken as the sum of the intrinsic "normal color" of a late type star plus the color excess due to "normal" interstellar extinction. The high value of the R-I color of the Be star Lk Hα 192 supports, in part, this last consideration;

b) After the outburst of V 1057 Cygni, the first one to obtain its spectrum in September 1970 was G. Welin (1971; and a private communication including the tracing of his objective prism spectrum), who classified it as approximately of B3 type; later on, Herbig and Harlan (1971) gave type A1 of luminosity class brighter than V, and in May 1971 Haro classified it as A1-2 of luminosity class III-IV. According to a private communication to Rieke et al. (1972), Herbig found that in June and July 1971 the star had a spectral type near A7III. In several of our Tonantzintla objective prism plates obtained in July 1972 the star appeared, because of the strength of the CaII K line, as A8-FO. I have learned through a private communication by Dr. Lee, that recently Herbig classified this star as an early F type. According to the above information it seems that V 1057 Cyg, which before 1969 was classified as an advanced T Tauri type star of approximately K spectral type, after the "slow flare-up" showed an early spectral type (B3) and two years later had evolved up to an early F type;

c) the continuous photographic monitoring at the Tonantzintla Observatory of V 1057 Cyg in the U, B, R and I colors shows that up to August, 1972 the star has slowly declined in brightness. Dr. Lee, quite independently, has also observed this and he informed us that in June of this year the V magnitude was 9.76 as compared to 9.34 in March, 1971. He also writes "It is interesting that the colors of Lk $H\alpha$ 192 and V 1057 Cyg (present) are very similar. We haven't seen any change in V 1057 Cyg at 2.2 μ or longer wave lengths.

Based on the above information we cannot avoid concluding:

1) That an intrinsic change has been and is taking place in V 1057 Cyg and, therefore, it is not a matter of a clearing or dissipation of a circumstellar shell.

2) The intrinsic process taking place in V 1057 Cygni is entirely similar to the one in FU Ori.

3) Contrary to what Herbig supposed (1966) the FU Ori type objects are not the antecedent of the T Tauri stage but, in certain cases, a later step in which the original mass of the previous T Tauri objects must play a fundamental role.

I would like to express my gratitude to Dr. Thomas A. Lee for his valuable cooperation and permission to quote his observations.

August 25, 1972

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Optica y Electrónica
Tonantzintla, Mexico

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 715

Konkoly Observatory
Budapest
1972 September 12

NEW FLARE STARS IN THE PLEIADES REGION
(A Re-examination of the Tonantzintla Photographic Material: 1963-1970)

The continued re-examination of all our multiple exposure photographic material obtained during the years 1963 through 1970 at the Tonantzintla Observatory on the Pleiades region (Haro and González 1970) has been exhaustively completed and we have found - apart of a large number of flare-up repetitions in the already known flare stars discovered at the Asiago, Byurakan and Tonantzintla Observatories - 12 new flare stars that for one reason or other escaped detection in our previous works.

The results are summarized in Table 1, in which a provisional new serial numbering is used adding a b to each number in order to distinguish the new flare stars from the ones listed and numbered before. This has been done because there is certain confusion and mixing-up in the serial numbers published by different Observatories. In a general catalogue that is under preparation by one of the authors (G.H.) we will put together all the flare stars found in the Pleiades region at various Observatories, using a more definitive serial numbering that will be arranged in order of increasing right ascension and avoiding, as far as possible, different numbers for the same star or repeating the same number for distinct flare stars.

In Table 1 the stars 2b and 6b have shown two flare-ups. The star 9b corresponds to HII2034 which is up to now the brightest flare star, at minimum, in the Pleiades (V = 12.57) and probably with a spectral type as early or earlier than K3. We erroneously communicated to Dr. Rosino the serial number of flare star 11b as No. 12 and he found a flare repetition of the same star, numbering it as 83.

The many flare-up repetitions found in the previously known flare stars will be published in a future paper.

Table 1

New Flare Stars in the Pleiades Region

1963-1970

No.	Star	R.A. (1900)	Dec. (1900)	Mag. in U at minimum	ΔmU	Date of Flare-up
1b		$3^h 33^m.6$	$+23^\circ 11'$	16.6	0.8	6 Feb. 1970
2b		3 33.8	23 36	20.5	6.3	22 Nov. 1963
<u>2b</u>		3 33.8	23 36	20.5	3.5	26 Nov. 1963
3b		3 36.2	23 53	18.4	2.5	21 Dec. 1968
4b	HII-979	3 40.4	24 08	17.8	1.1	27 Oct. 1968
5b		3 41.3	22 03	21.0	5.1	10 Nov. 1963
6b		3 41.5	24 51	19.5	5.1	11 Nov. 1963
<u>6b</u>		3 41.5	24.51	19.5	2.7	20 Nov. 1968
7b		3 42.7	23 55	18.8	3.4	12 Jan. 1970
8b		3 42.7	24 43	18.5pg.	1.0pg.	26 Oct. 1968
9b	HII 2034	3 42.8	23 40	14.2	0.8	6 Nov. 1966
10b		3 42.9	22 35	18.9	3.8	14 Nov. 1969
11b		3 45.9	25 30	20.0	4.5	16 Dec. 1968
12b		$3^h 47^m.3$	$+25^\circ 38'$	18.3	3.1	14 Jan. 1969

August 28, 1972

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Optica y Electrónica

Tonantzintla, Mexico

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1 Haro, G. and González, G. 1970. Bol. Obs. Ton. v Tac. <u>34</u>, 191.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 716

Konkoly Observatory
Budapest
1972 September 12

NEW FLARE STARS IN THE PLEIADES REGION (1971-1972)

During the months of October, November and December, 1971 and January, 1972 we obtained 115 ultraviolet multiple exposure plates centered in Alcyone. The number of different exposures were 725 and the total time of effective observation 135^h45^m. Table 1 summarizes our results but only comprises the new flare stars found. The many flare-up repetitions in the previouslv known flare stars are not included. The numbering of the new flare stars is the continuation of the new serial numbers used by Haro and González (1972).

August 28, 1972

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References:

1) Haro, G. and González, G. 1972. IAI Information Bulletin on Variable Stars, No. 715.

Table 1

New Flare Stars in the Pleiades Region
(1971-1972)

No.	Star	R.A. (1900)	Dec. (1900)	Mag. in U at minimum	ΔmU	Date of Flare-up
13b		$3^h 36^m.2$	$+21^\circ 57'$	19.3	3.5	14 Nov. 1971
14b		3 36.8	23 02	19.5	3.5	20 Nov. 1971
14b		3 36.8	23 02	19.5	5.5	21 Nov. 1971
15b		3 37.3	23 15	20.5	6.3	15 Dec. 1971
16b		3 37.9	24 44	20.0	5.1	15 Jan. 1972
17b		3 38.1	23 55	21.0	5.7	12 Nov. 1971
18b		3 38.4	24 17	20.7	5.5	12 Nov. 1971
19b		3 38.5	25 03	20.0	3.8	22 Nov. 1971
20b		3 39.3	23 48	18.3	2.0	10 Dec. 1971
21b		3 39.5	24 44	21.0	5.7	22 Dec. 1971
22b	HII 628	3 39.5	24 25	16.0	0.8	17 Oct. 1971
23b		3 40.4	23 43	20.5	7.2	17 Dec. 1971
24b	HII 1009	3 40.5	24 09	17.5	1.0	12 Dec. 1971
25b		3 40.8	25 09	19.0	3.2	23 Nov. 1971
26b		3 40.9	22 46	18.8	2.7	12 Dec. 1971
26b		3 40.9	22 46	18.8	2.9	20 Dec. 1971
27b	HII 1280	3 41.1	23 51	16.8	0.9	15 Nov. 1971
27b	HII 1280	3 41.1	23 51	16.8	0.6	11 Dec. 1971
28b	HII 1321	3 41.2	23 26	17.6	1.3	18 Nov. 1971
29b		3 41.4	23 25	20.0	5.0	16 Nov. 1971
30b		3 41.4	21 56	17.5	2.0	12 Dec. 1971
31b		3 43.2	22 48	19.8	6.2	22 Nov. 1971
32b		3 43.4	25 31	16.3	1.8	12 Nov. 1971
33b		3 46.7	24 27	15.4	2.2	12 Dec. 1971
34b		$3^h 49^m.6$	$+23^\circ 29'$	16.0	0.7	14 Dec. 1971

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Konkoly Observatory
Budapest
1972 September 21

58^{th} NAME–LIST OF VARIABLE STARS

The present 58^{th} Name–list of variable stars has been composed in accordance with the rules established in the 56^{th} list. It contains all necessary identifications for 1836 new variable stars designated in 1972. In the square brackets the reference number is given for the work where (not always firstly) the information on discovery of the variable had been published. This reference number accompanies designation or number of the star given for it in the cited work. Name of the discoverer is mentioned only in the cases when it is not coincides with the name of the author of the cited work.

Reference numbers 0001–5216 correspond to the numbers from literature list published in the first volume of the 3^{rd} edition of General Catalogue of Variable Stars (pages A42–A121). The numbers 5217–5824 correspond to the supplementary list published in the First supplement to the third edition of the General Catalogue of Variable Stars (pages 279–289). The numbers 5825–5947 correspond to the list given in the present edition (pages 34 – 36).

The serial numbers of flare variables in the Pleiades cluster are preceded here by the symbol Plf.

We are grateful to *E.B.Khoteemskaya, T.A.Mikhareva,* and *T.D.Nishtcheva* for their help in compiling of this list.

B.V.Kukarkin, P.N.Kholopov,
N.P.Kukarkina, N.B.Pereva

Variable Star Commission of the Astronomical Council
of the Academy of Sciences of the USSR and the
Sternberg Astronomical Institute

Moscow, July, 1972

GQ And = BD+43°44B [5825] = ADS 246B = = СПЗ 1804.

GR And = BD+31°59 (6.7) = SAO 53921 = = HD 2453 (A0p) = КЗП 5857 = = Babcock 1 [4170].

GS And = СПЗ 1729 [5826].

GT And = СПЗ 1732 [5827].

GU And = СПЗ 1666 [5493].

GV And = КЗП 5683 = СПЗ 942 [0558], *Фад-деева.*

YY Ant = CoD–37°6230 (8.5) = = CPD–37°3886 (9.4) = SAO 200972 = = HD 87041 (Mb) [5828].

YZ Ant = CoD–31°8125 (9.4) = = CPD–31°3019 (9.4) = = HD89298 (A) = BV 831 [5201].

FZ Aps = BV 1236 [5829].

GG Aps = P 3702 = КЗП 2126 = = 156.1934 [2588] = HV 8584 = = BV 1237 [5829].

GH Aps = КЗП 2854 = S5027 [0085] = = BV 1284 [5834].

EM Aqr = HR 8006 [5500] = BD–1°4075 (6.7) = = SAO 144941 = HD 199124 (F0).

V 1285 Aql = AC+8°142–393 [5831] = = СПЗ 1805.

V1286 Aql = 10 Aql = HR 7167 = = BD+13°3838 (6.4) = SAO 104303 = = HD 176232 (A3p) = КЗП 8073 = = Babcock 66 [4170].

V1287 Aql = 26 [5832].

V1288 Aql = 21 Aql = HR 7287 = = BD+2°3824 (5.6) = SAO 124408 = = ADS 12182 = HD 179761 (B8) = = КЗП 8128 = Babcock 67 [4170].

V1289 Aql = КЗП 4758 = Zi 1756 = 67.1903 [5833].

V1290 Aql = КЗП 4809 = Zi 1783 = = 72.1903 [5833].

V1291 Aql = HR 7575 = BD–3°4742 (6.2) = = SAO 143883 = HD 188041/2 (F0p+A) = КЗП 8327 = Bab-cock 72 [4170].

V1292 Aql = 50 [5832].

V614 Ara = КЗП 2876 = P4182 = = 478.1935 [4194, 4001] = = HV 8991 = BV 1246 [5829].

V615 Ara = КЗП 2878 = P1142 = = 501.1933 [2926, 4001] = = HV 8992 = BV 1285 [5834].

V616 Ara = CoD–46°11218 (9.0) = = CPD–46°8391 (8.2) = = SAO 227631 = HD 154339 (B5) = = BV 1215 [5557].

V617 Ara = КЗП 2956 = P4212 = = HV 6707 [0251, 4001] = = BV 1286 [5834].

V618 Ara = КЗП 3282 = P1263 = = 525.1933 [2926] = HV 9083 = = BV 1290 [5834].

V619 Ara = КЗП 3309 = P4380 [2935] = = 526.1935 [2935] = HV 9088 = = BV 1249 [5829].

V620 Ara = CoD–56°7036 (9.7) = = CPD–56°8436 (9.0) = SAO245020 = = HD 161160 (A0) = BV 1161 [5835].

γ Ari = γ Ari (S) [5900] = 5 Ari (S) = HR 546 = = BD+18°243 (3.5) (S) = SAO 92681 = = ADS 1507 A = HD 11503 (A0p). There is a close physical companion SAO 92680 of spectral class B9V and about the same brigthness, at the distance 8″ to the north of the variable.

MY Aur = СПЗ 1627 [5836].

MZ Aur = BD+36°1090 (8.2) [5837] = = SAO 57915 = AGK_2+36°538 (7.8) = = HD 34626 (B2) [5838] = = КЗП 102467.

NN Aur = S 10487 [5839].
NO Aur = HR 1939 [5840, 5841] =
= BD+31°1049 (6.6) = SAO 58322=
= HD 37536 (Ma) = DO 11453 (M1).
NP Aur = КЗП 755 = P2830 = 644.1936 [0122].
BX Boo = HR 5597 = BD+47°2192 (6.3) =
= SAO 45326 = ADS 9477 A =
= HD 133029 (A0p) [4511] =
= КЗП 7162.
Y Cae = CoD−40°1611 (8.4) =
= CPD−40°581 (9.1) = HD 31036 (Ma)
[5828].
Z Cae = CoD−43°1590 (7.2) =
= CPD−43°514 (8.6) = SAO 217051=
= HD 31311 (Ma) [5828].
BL Cnc = 9 Cnc = HR 3169 [5840, 5841] =
= BD+23°1887 (6.0) =
= SAO 79940 = HD 66875 (Mb) =
= DO 13398 (M4).
BM Cnc = 15 Cnc = HR 3215 =
= BD+30°1664 (5.6) = SAO 80016=
= HD 68351 (A0p) = КЗП 6620 =
= Babcock 29 [4170].
BN Cnc = BD+19°2073 (8.2) = SAO 98027 =
= HD 73763 (A5) = Praesepe
KW 323 [5830, 5842].
BO Cnc = HR 3521 [5840, 5841] =
= BD+28°1659 (6.5) = SAO 80476 =
= HD 75716 (Ma) = DO 13706 (M6).
ϰ Cnc = 76 Cnc = HR 3623 =
= BD+11°1984 (5.5) = SAO 98378 =
= HD 78316 (B8) [4170] =
= Zi 733 = КЗП 101025.
FQ CMa = CoD−28°3802 (9.6) =
= CPD−28°1673 (9.6) =
= BV 632 [5843].
AZ CMi = HR 2989 [5844] =
= BD+2°1761 (7.2) = SAO 115864 =
= HD 62437 (F0).
BB CMi = BD+5°1811 (9.4) = P3072 =
= 316.1934 [0196] = КЗП 1154.
ε Cap = 39 Cap = HR 8260 [4970] =
= BD−20°6251 (4.7) =
= CPD−20°8185 (4.6) = SAO 164520=
= HD 205637 (B5p) = КЗП 8668.
QV Car = CoD−58°2563 (8.5) =
= CPD−58°1494 (9.6) =
= HD 81099 (Mb) [5828] =
= КЗП 102617 = SA 192, № 264
[5208].
QW Car = CPD−73°616 (9.9) =
= BV 1047 [5845].
QX Car = 163 Car = CoD−57°2897 (7.0) =
= CPD−57°2418 (7.1) =
= SAO 237480 = HD 86118 (B5) =
= BV 470 [4362].
QY Car = HR 4009 [5846] =
= CoD−57°3063 (6.6) =
= CPD−57°2781 (6.7) = SAO 237776=
= HD 88661 (B2p) = КЗП 6775.
QZ Car = CoD−59°3287 (7.3) =
= CPD−59°2572 (7.0) = SAO 238414=
= HD 93206 (B0) [4700] = КЗП 6797.
V335 Car = КЗП 1649 = S 4941 [0085] =
= BV 1230 [5829].
V486 Cas = BD+51°133 (7.0) = SAO 21646 =
= HD 3950 (B3) [5847] = СПЗ 1806.
V487 Cas = BD+63°141 (8.3) [4513, 5848] =
= SAO 11581 = HD 6474 (K2p).
V488 Cas = GR 182 [5849].
V489 Cas = GR 183 [5849].
V490 Cas = GR 184 [5849].
V491 Cas = GR 185 [5849].
V492 Cas = GR 186 [5849].
V493 Cas = GR 187 [5849].
V494 Cas = GR 188 [5849].
V495 Cas = GR 189 [5849].
V496 Cas = GR 190 [5849].

V497 Cas = GR 191 [5849]. Near IC 1848 cluster.
V498 Cas = GR 192 [5849]. In the IC 1848 cluster.
V499 Cas = GR 193 [5849]. Near IC 1848 cluster.
V500 Cas = GR 194 [5849]. Near КЗП 6000.
V501 Cas = GR 196 [5849].
V502 Cas = GR 195 [5849].
V503 Cas = GR 197 [5849].
V504 Cas = GR 198 [5849].
V505 Cas = GR 199 [5849].
V506 Cas = GR 201 [5849].
V507 Cas = GR 200 [5849].
V508 Cas = GR 202 [5849].
V509 Cas = HR 8752 = BD+56°2923 (6.0) = = SAO 35039 = HD 217476 (G0p) [5850, 4513, 5851, 5852].
V750 Cen = 159 [5853].
V751 Cen = 190 [5853].
V752 Cen = CoD−35°7392 (9.0) = = CPD−35°4943 (8.7) = = SAO 202729 = HD 101799 (G0) [5854] = BV 502 [4371].
V753 Cen = CoD−55°4268 (9.8) = = CPD−55°4676 (9.3) = = HD 302013 (A5) [5855].
V754 Cen = BV 1233 [5829].
V755 Cen = 2 [5856].
V756 Cen = 3 [5856].
V757 Cen = CoD−36°8903 (8.5) = = CPD−36°6160 (8.4) = = SAO 204919 = HD 120734 (G5) [5854].
V758 Cen = CoD−54°5438 (10½) = = CPD−54°5772 (8.8) = = SAO241248 = HD120738 (B9) = = BV 1101 [5857].
V759 Cen = CoD−47°8945 (7.7) = = CPD−47°6410 (7.8) = = SAO 224743 = HD 123732 (F8) [5854].
V760 Cen = $14^h 05^m.4 - 58°57'.6$ (1900.0) [5858].
V761 Cen = a Cen = HR 5378 [4981, 4457] = = CoD−38°9329 (4.9) = = CPD−38°5821 (4.7) = = SAO 205497 = HD 125823 (B5) = = КЗП 7125.
V762 Cen = CPD−62°4165 (10.3) = = BV 1155 [5835].
IN Cep = P5429 = 500.1934 [0542] = = КЗП 5201.
IO Cep = Vat ph+57°55348 = КЗП 5373 = = СПЗ 976 [1318].
IP Cep = P5640 = 558.1936 [4475] = = КЗП 5475.
IQ Cep = КЗП 8705 = GR 65 [4318, 4317] = = VV 283 [5862].
IR Cep = BD+60°2321 (7.8) = SAO 19765 = = AGK_2+60°1430 (8.6) = = HD 208960 (G0) = HBV 476 [5860], *Wachmann.*
IS Cep = СПЗ 1631 [5861].
IT Cep = VV300 [5862].
IU Cep = VV301 [5862].
IV Cep = Nova Cep 1971 [5863], *Yoshiyuki Kuwano.*
IW Cep = 40.1939 [0922] = КЗП 5511 = = VV 308 [5862].
IX Cep = VV 320 [5862].
IY Cep = VV 322 [5862].
IZ Cep = VV 325 [5862].
KK Cep = VV 330 [5862].
KL Cep = VV 334 [5862].
KM Cep = VV 335 [5862].
KN Cep = VV 336 [5862].

KO Cep = VV 337 [5862].
KP Cep = VV 340 [5862].
KQ Cep = VV 341 [5862].
KR Cep = VV 342 [5862].
KS Cep = VV 350 [5862].
KT Cep = VV 353 [5862].
KU Cep = 16 [0535] = КЗП 5539 =
= VV 356 [5862].
KV Cep = VV 365 [5862].
KW Cep = VV 382 [5862].
KX Cep = VV 387 [5862].
KY Cep = $22^h 29^m + 57°05'$ (1900.0) [5864] =
= СПЗ 1807.
KZ Cep = BD + 62°2136 (7.5) = SAO 20332 =
= HD 217035 (B5) [5522].
LL Cep = P 5721 = КЗП 5656 = 663.1936
[5177].
YZ Cet = LPM 63 [5865].
ZZ Cet = R 548 [5866].
AA Cet = CoD − 23°737 (7.5) =
= CPD − 23°227 (6.2) =
= SAO 167451 = HD 12180 (F2) =
= ADS 1581 A = BV 1481 [5867].
AB Cet = HR 710 = BD − 15°426 (6.0) =
= SAO 148386 = HD 15144 (A2) =
= ADS 1849 = КЗП 5987 =
= Babcock 8 [4170].
FT Com = КЗП 6925 = 3 [5534].
FU Com = КЗП 6926 = 4 [5534].
FV Com = СПЗ 378 [0839], *L. Albitsky* =
= P 845 = КЗП 1904 [5868].
FW Com = КЗП 6949 = 10 [5534].
FX Com = КЗП 6955 = 12 [5534].
FY Com = КЗП 6962 = 13 [5534].
FZ Com = 46 [3950].
GG Com = 54 [3950].
V656 CrA = 686 [5869].
V657 CrA = 689 [5869].
V658 CrA = 946 [5869].
V659 CrA = 988 [5869].
V660 CrA = 1118 [5869].
V661 CrA = 1187 [5869].
V662 CrA = 1235 [5869].
V663 CrA = 1262 [5869].
V664 CrA = 1274 [5869].
V665 CrA = 1430 [5869]. Near YY, YZ,
and ZZ CrA.
V666 CrA = 1474 [5869].
V667 CrA = 2 [5870].
γ CrB [1106, 5871] = HR 5849 =
= BD + 26°2722 ($4.^m0$) =
= SAO 83958 = HD 140436 (A0) =
= ADS 9757 = Zi 1151 =
= КЗП 101523.
RW Crt = BD − 8°3081 (8.2) =
= SAO 137985 = HD 96297 (Mb)
[5828].
RX Crt = BD − 21°3280 (7.2) =
= CPD − 21°4898 (8.2) =
= SAO 179746 = HD 98218 (Mb)
[5828].
RY Crt = BD − 19°3272 (8.9) =
= CPD − 19°4865 (9.2) =
= HD 99690 (Mb) [5828].
RZ Crt = GR 153 [5872, 5947].
SS Crt = BD − 17°3418 (8.9) =
= SAO 156775 = HD 100766 (Mb)
[5828].
ST Crt = GR 154 [5872, 5947].
BH Cru = $12^h 11.^m1 - 55°43'$ (1900,0) [5873],
Welch.
V1343 Cyg = VV 264 [5874].
V1344 Cyg = VV 272 [5875].
V1345 Cyg = СПЗ 1596 [5876].
V1346 Cyg = VV 265 [5874].
V1347 Cyg = VV 273 [5875].

V1348 Cyg = СПЗ 1598 [5876].
V1349 Cyg = VV 274 [5875].
V1350 Cyg = VV 275 [5875].
V1351 Cyg = HR 7509 [5840] = = BD+55°2245 (6.8) = = SAO 31906 = HD 186532 (Mb) = = DO 37752 (M5).
V1352 Cyg = VV 276 [5875].
V1353 Cyg = VV 266 [5874].
V1354 Cyg = VV 267 [5874].
V1355 Cyg = VV 268 [5874].
V1356 Cyg = BD+29°3814 (9.5) = = HBV 477 [5877].
V1357 Cyg = BD+34°3815 (9.0) [5878] = = SAO 69181 = HD 226868 (B) = = Cyg X–1 = СПЗ 1808 = = AGK_2+35°1910 (9^m).
V1358 Cyg = VV 269 [5874].
V1359 Cyg = VV 270 [5874].
V1360 Cyg = VV 277 [5875].
V1361 Cyg = VV 278 [5875].
V1362 Cyg = BD+36°3841 (8.0) = = SAO 69334 = HD 190467 (B2) [5838].
V1363 Cyg = VV 279 [5875].
V1364 Cyg = VV 280 [5875].
V1365 Cyg = GR 157 [5352].
V1366 Cyg = GR 158 [5352].
V1367 Cyg = GR 159 [5352].
V1368 Cyg = КЗП 8453 = 37 [1222].
V1369 Cyg = КЗП 5077 = P2075 = = 720.1933 [0492, 0085].
V1370 Cyg = GR 160 [5352].
V1371 Cyg = GR 161 [5352].
V1372 Cyg = BD+53°2368 (6.5) = = SAO 32379 = HD 192678 (A0) = = КЗП 8476 = Babcock 75 [4170].
V1373 Cyg = GR 162 [5352].
V1374 Cyg = GR 163 [5352].
V1375 Cyg = GR 164 [5352].
V1376 Cyg = GR 165 [5352].
V1377 Cyg = GR 166 [5352].
V1378 Cyg = GR 167 [5352].
V1379 Cyg = GR 168 [5352]. Near V1318 Cyg.
V1380 Cyg = GR 146 [5544].
V1381 Cyg = GR 169 [5352].
V1382 Cyg = GR 170 [5352].
V1383 Cyg = GR 171 [5352].
V1384 Cyg = GR 172 [5352].
V1385 Cyg = GR 173 [5352].
V1386 Cyg = GR 174 [5352].
V1387 Cyg = КЗП 8522 = S7576 [4006].
V1388 Cyg = BD+38°4099 (9.3) = = DO 19028 (M1) = КЗП 8524 = = Wr 51 [5179, 4067].
V1389 Cyg = GR 175 [5352].
V1390 Cyg = GR 177 [5352].
V1391 Cyg = GR 178 [5352].
V1392 Cyg = GR 179 [5352].
V1393 Cyg = КЗП 5214 = P5430 = = 542.1936 [0796].
V1394 Cyg = GR 180 [5352].
V1395 Cyg = BD+46°3082 (9.4) [5128] = = SAO 50158 = HD 198973 (Ma), *Smak*.
V1396 Cyg = AC+39°1214–608 [5716].
V1397 Cyg = VV 281 [5862].
V1398 Cyg = СПЗ 1629 [5861].
V1399 Cyg = СПЗ 1696 [5882].
V1400 Cyg = VV 284 [5862].
V1401 Cyg = VV 285 [5862].
V1402 Cyg = S9694 [5142] = VV 286 [5862].
V1403 Cyg = BD+50°3498 (9.5) = = VV 287 [5862].
V1404 Cyg = VV 288 [5862].

V1405 Cyg = VV 289 [5862].
V1406 Cyg = VV 290 [5862].
V1407 Cyg = VV 291 [5862].
V1408 Cyg = VV 292 [5862].
V1409 Cyg = СПЗ 1630 [5861].
V1410 Cyg = СПЗ 1634 [5861].
V1411 Cyg = VV 293 [5862].
V1412 Cyg = VV 295 [5862].
V1413 Cyg = VV 294 [5862].
V1414 Cyg = КЗП 5506 = S 4574 [0085].
V1415 Cyg = СПЗ 1697 [5882].
V1416 Cyg = VV 296 [5862].
V1417 Cyg = VV 297 [5862].
V1418 Cyg = VV 298 [5862].
V1419 Cyg = VV 299 [5862].
V1420 Cyg = СПЗ 1632 [5861].
r Cyg [5883, 5881] = 65 Cyg = HR 8130 = = BD+37°4240 (4.0) = = SAO 71121 = HD 202444 (F0) = = ADS 14787 = КЗП 102076 = = Zi 1999.
IL Del = S 10686 [5884].
IM Del = S 10689 [5884].
IN Del = S 10691 [5884].
IO Del = S 10693 [5884].
IP Del = S 10695 [5884].
IQ Del = S 10696 [5884].
IR Del = S 10697 [5884].
IS Del = S 10699 [5884].
IT Del = P 5419 = КЗП 5195 = = СПЗ 648 [4386].
IU Del = S 10700 [5884].
IV Del = S 10702 [5884].
IW Del = S 10703 [5884].
IX Del = S 10704 [5884]. Near DE Del.
IY Del = S 10706 [5884].
IZ Del = S 10708 [5884].
KK Del = S 10707 [5884].
KL Del = S 10711 [5884].
KM Del = S 10713 [5884].
KN Del = S 10715 [5884].
KO Del = S 10717 [5884].
KP Del = BD+17°4397 (8.3) = = SAO 106453 = HD 197753 (Ma) [5885] = DO 19345 (M5).
WW Dor = CoD−50°1314 (8.4) = = CPD−50°566 (9.1) = = SAO 233439 = HD 27002 (Ma) [5828].
WX Dor = CoD−53°885 (9.0) = = CPD−53°670 (9.2) = = SAO 233449 = HD 27199 (Mb) [5828].
WY Dor = CoD−67°289 (10.0) = = CPD−67°353 (9.8) = = HD 31275 (Mb) [5828].
WZ Dor = HR 1695 [5840] = = CoD−63°188 (6.0) = = CPD−63°420 (7.1) = = SAO 249198 = HD 33684 (Mb).
CO Dra = КЗП 4896 = 195175 [1464].
γ Equ [4511] = 5 Equ = HR 8097 = = BD+9°4732 (4.0) = = SAO 126593 = ADS 14702 A = = HD 201601 (F0p) [4170] = = КЗП 8626.
CU Eri = BD−13°525 (8.3) = SAO 148600 = = HD 17387 (G5) [5886].
CV Eri = 7 Eri = HR 904 [5150, 5841, 5840] = BD−3°478 (6.8) = = SAO 130242 = HD 18760 (Ma) = = DO 597 (M5).
CW Eri = BD−18°527 (7.8) = SAO 148743 = = HD 19115 (F0) = BV 1000 [5562].
CX Eri = CoD−39°1306 (8.5) = = CPD−39°383 (9.4) = SAO 194722 = = HD 25761 (Ma) [5828].

CY Eri = BD−10°834 (6.8) = SAO 149368 = = HD 25921 (Mb) [5828].

CZ Eri = CoD − 39°1336 (8.7) = CPD − 39°393 (9.5) = SAO 194779 = = HD 26231 (Ma) [5828].

DD Eri = BD−8°797 (9.0) = SAO 130984 = = HD 26258 (Mc) [5828].

DE Eri = BD − 20°798 (8.7) = CPD − 20 505 (9.1) = SAO 169201 = = HD 26535 (Mb) [5828].

DF Eri = CoD − 36°1638 (7.7) = CPD − 36°495 (9.0) = SAO 194838 = = HD 26832 (Ma) [5828].

DG Eri = BD −17°856 (7.0) = SAO 149559 = = HD 27598 (Ma) [5828].

DH Eri = CoD − 28° 1527 (8.0) = CPD − 28°523 (8.5) = SAO 169405 = = HD 27957 (Mb) [5828].

NP Gem = HR 2631 [5841, 5840] = BD + 17°1479 (6.0) = SAO 96407 = = HD 52554 (Ma) = DO 12743 (M6).

V634 Her = КЗП 2675 = 27.1939 [4192].

V635 Her = P 4135 = 653.1936 [0122] = = КЗП 2803.

V636 Her = HR 6242 [5841, 5840] = BD + 42°2749 (6.5) = SAO 46288 = = HD 151732 (Mb) = DO 35442 (M3).

V637 Her = 52 Her = HR 6254 = BD + 46°2220 (5.0) = SAO 46305 = = ADS 10227 = HD 152107 (A2p) = = КЗП 7514 = Babcock 60 [4170].

V638 Her = СПЗ 1767 = 7 [5888].

V639 Her = КЗП 7640 = Ross 867 [2799].

V640 Her = HR 6495 [5841, 5840] = BD + 17°3241 (6.2) = SAO 102819 = = HD 157967 (Mb) = DO 15972 (M5).

V641 Her = P 1272 = КЗП 3346 = СПЗ 317 [1980].

TU Hor = HR 1081 [4613] = CoD −47°1071 (8.1) = CPD −47°351 (6.5) = SAO 216357 = = HD 21981 (A0) = КЗП 6035.

HU Hya = BD − 10°2409 (9.1) = HD 68178 (A2) = BV 1048 [5345].

HV Hya = 3 Hya = HR 3398 = BD −7°2540 (5.7) = SAO 136076 = = HD 72968 (A2p) = КЗП 6644 = = Babcock 31 [4170].

HW Hya = BD − 20°3094 (8.4) = CPD −20°4836 (8.8) = SAO 178386 = = HD 87555 (Mb) [5828].

HX Hya = CoD − 23°9421 (8.0) = CPD −23°4987 (9.0) = SAO 179035 = = HD 92017 (Mb) [5828].

HY Hya = CoD − 25°8542 (8.0) = CPD −25°4716 (8.4) = SAO 179679 = = HD 97754 (Mb) [5828].

HZ Hya = CoD − 25°8667 (7.8) = CPD −25°4757 (8.6) = SAO 179882 = = HD 99448 (Mb) [5828].

II Hya = HR 4532 [5889] = CoD −26°8789 (5.8) = CPD − 26°4595 (7.1) = SAO 180208 = = HD 102620 (Mb) [5828, 5890].

IK Hya = CoD − 26°8952 (9.7) = CPD −26°4646 (9.6) = BV 504 [4371].

BB Hyi = CPD −74°214 [5891, *Alexander*] = BV 1041 [5845].

HM Lac = VV 302 [5862].

HN Lac = VV 303 [5862].

HO Lac = VV 304 [5862].

HP Lac = VV 305 [5862].

HQ Lac = VV 306 [5862].

HR Lac = VV 309 [5862].

HS Lac = VV 310 [5862].

HT Lac = HR 8421 [5841, 5840] = BD +46°3574 (6.5) = SAO 51632 = = HD 209857 (Mb) = DO 40695 (M5).
HU Lac = VV 311 [5862].
HV Lac = VV 312 [5862].
HW Lac = VV 313 [5862].
HX Lac = КЗП 5513 = S 4577 [0085].
HY Lac = VV 314 [5862].
HZ Lac = VV 315 [5862].
II Lac = VV 316 [5862].
IK Lac = VV 317 [5862].
IL Lac = VV 318 [5862].
IM Lac = VV 319 [5862].
IN Lac = VV 321 [5862].
IO Lac = VV 323 [5862].
IP Lac = VV 324 [5862].
IQ Lac = VV 326 [5862].
IR Lac = VV 327 [5862].
IS Lac = VV 328 [5862].
IT Lac = VV 329 [5862].
IU Lac = VV 331 [5862].
IV Lac = VV 332 [5862].
IW Lac = VV 333 [5862].
IX Lac = VV 338 [5862].
IY Lac = VV 339 [5862].
IZ Lac = VV 343 [5862].
KK Lac = VV 344 [5862].
KL Lac = VV 346 [5862].
KM Lac = VV 347 [5862].
KN Lac = VV 348 [5862].
KO Lac = VV 349 [5862].
KP Lac = VV 351 [5862].
KQ Lac = GR 204 [5892].
KR Lac = VV 352 [5862].
KS Lac = VV 354 [5862].
KT Lac = VV 355 [5862].
KU Lac = КЗП 5540 = S 4586 [0085] = = VV 357 [5862].
KV Lac = VV 358 [5862].
KW Lac = VV 359 [5862].
KX Lac = VV 360 [5862].
KY Lac = VV 362 [5862].
KZ Lac = VV 363 [5862].
LL Lac = VV 364 [5862].
LM Lac = VV 366 [5862].
LN Lac = VV 367 [5862].
LO Lac = VV 368 [5862].
LP Lac = VV 369 [5862].
LQ Lac = VV 370 [5862].
LR Lac = VV 371 [5862].
LS Lac = VV 372 [5862].
LT Lac = VV 373 [5862].
LU Lac = VV 374 [5862].
LV Lac = VV 375 [5862].
LW Lac = VV 376 [5862].
LX Lac = VV 377 [5862].
LY Lac = VV 378 [5862].
LZ Lac = VV 379 [5862].
MM Lac = VV 380 [5862].
MN Lac = VV 381 [5862].
MO Lac = VV 383 [5862].
MP Lac = VV 384 [5862].
MQ Lac = VV 385 [5862].
MR Lac = VV 386 [5862].
MS Lac = VV 388 [5862].
MT Lac = VV 389 [5862].
MU Lac = VV 390 [5862].
MV Lac = VV 392 [5862].
MW Lac = VV 395 [5862].
MX Lac = VV 396 [5862].
MY Lac = VV 397 [5862].
MZ Lac = VV 399 [5862].
NN Lac = VV 400 [5862].
NO Lac = КЗП 5562 = S 4591 [0085] = = VV 401 [5862].
NP Lac = VV 402 [5862].

NQ Lac = VV 403 [5862].
NR Lac = VV 404 [5862].
NS Lac = VV 405 [5862].
NT Lac = VV 406 [5862].
NU Lac = VV 407 [5862].
NV Lac = VV 408 [5862].
NW Lac = VV 409 [5862].
NX Lac = VV 411 [5862].
NY Lac = VV 412 [5862].
NZ Lac = VV 413 [5862].
OO Lac = VV 414 [5862].
OP Lac = VV 415 [5862].
OQ Lac = VV 416 [5862].
OR Lac = VV 417 [5862].
OS Lac = P 2352 = 94.1927 [4738] =
= КЗП 5579 = VV 418 [5862].
OT Lac = VV 419 [5862].
OU Lac = VV 420 [5862].
OV Lac = VV 421 [5862].
OW Lac = VV 422 [5862].
OX Lac = VV 423 [5862].
OY Lac = 6.1938 [5893, *Baade*] =
= КЗП 5595 = VV 425 [5862].
OZ Lac = VV 426 [5862].
PP Lac = $22^h 38^m 34^s + 52°55'$ (1900.0)
[5894] = КЗП 8787 = Wr 21 [4067] =
= VV 427 [5862].
CW Leo = IRC + 10216 [5895].
CX Leo = 45 Leo [4170, 5896] = HR 4101 =
= BD + 10°2152 (7.0) = SAO 99136 =
= ADS 7781 = HD 90569 (A0) =
= КЗП 6786.
CY Leo = КЗП 102651 = G 44–32 [4139].
CZ Leo = BD – 3°3134 (8.9) = SAO 138245 =
= HD 100141 (Mb) [5828] =
= DO 3108 (M5).
RX LMi = HR 4184 [5841, 5840] = BD
+ 32°2066 (6.5) = SAO 62206 =
= HD 92620 (Ma) = DO 14251 (M5).
FW Lib = CPD – 20°6091 (9.8) = BV 852
[5201] = BV 875 [5236].
FX Lib = 48 Lib [5897] = HR 5941 [4621] =
= BD – 13°4302 (5.0) = SAO 159607 =
= HD 142983 (B3p) = КЗП 7253.
GK Lup = 379.1935 [2935] = P 3841 =
= КЗП 2209 = HV 8631 =
= BV 1239 [5829].
GL Lup = 408.1935 [2935] = P 3951 =
= КЗП 2419 = HV 8770 =
= BV 1243 [5829].
V406 Lyr = КЗП 4208 = СПЗ 1015 [0538].
V407 Lyr = GR 203 [5892].
V408 Lyr = СПЗ 1636 [5898].
V409 Lyr = СПЗ 1581 [5876].
V410 Lyr = СПЗ 1582 [5876].
V411 Lyr = СПЗ 1637 [5898].
V412 Lyr = СПЗ 1583 [5876].
V413 Lyr = СПЗ 1638 [5898].
V414 Lyr = СПЗ 1639 [5898].
V415 Lyr = СПЗ 1640 [5898].
V416 Lyr = СПЗ 1641 [5898].
V417 Lyr = СПЗ 1642 [5898].
V418 Lyr = СПЗ 1643 [5898].
V419 Lyr = СПЗ 1584 [5876].
V420 Lyr = СПЗ 1585 [5876].
V421 Lyr = СПЗ 1586 [5876].
V422 Lyr = СПЗ 1645 [5898].
V423 Lyr = СПЗ 1587 [5876].
V424 Lyr = СПЗ 1588 [5876].
V425 Lyr = СПЗ 1646 [5898].
V426 Lyr = СПЗ 1589 [5876].
V427 Lyr = СПЗ 1590 [5876].
V428 Lyr = СПЗ 1647 [5898].
V429 Lyr = СПЗ 1648 [5898].
V430 Lyr = СПЗ 1649 [5898].
V431 Lyr = СПЗ 1650 [5898].
V432 Lyr = СПЗ 1652 [5898].
V433 Lyr = СПЗ 1653 [5898].

V434 Lyr = СПЗ 1655 [5898].
V435 Lyr = VV 263 [5874].
V436 Lyr = СПЗ 1657 [5898].
V437 Lyr = СПЗ 1658 [5898].
V438 Lyr = СПЗ 1659 [5898].
V439 Lyr = СПЗ 1662 [5898].
V440 Lyr = СПЗ 1663 [5898].
V441 Lyr = СПЗ 1665 [5898].
V442 Lyr = VV 271 [5875].
AT Mic = CoD−32°16135 (9.2) [4639] = = CPD−32°6181 (10.3) = = SAO 212355 = HD 196982 (Pec) = = КЗП 103014 = BV 594 [4181].
AU Mic = CoD−31°17815 (8.0) = CPD −31°6335 (6.8) = SAO 212402 = = HD 197481 (K5) [4456, 5901] = = КЗП 8565.
V577 Mon = Ross 614 [2767] = КЗП 6458/9. There are two stars (d=1".2); it is known what of them is the variable one.
V578 Mon = BD+4°1299 (9.2) = HD 259135 (B2) [5879]. Near V549 Mon.
V579 Mon = СПЗ 1720 [5902]. Near NW Mon.
V580 Mon = СПЗ 1721 [5902]. Near NZ Mon.
V581 Mon = СПЗ 1722 [5902]. Near V360 Mon.
V582 Mon = СПЗ 1723 [5902].
V583 Mon = СПЗ 1724 [5902].
V584 Mon = СПЗ 1725 [5902]. Near V367 Mon.
V585 Mon = СПЗ 1726 [5902].
V586 Mon = СПЗ 1727 [5902].
DZ Mus = CoD−69°950 (8.5) = CPD −69°1617 (8.3) = SAO 251674 = = HD 104191 (A0) = = BV 1209 [5557].
EE Mus = 1 [5856].
EF Mus = CoD−69°1046 (7.2) = CPD −69°1725 (8.0) = SAO 252081 = = HD 111953 (K0) = BV 1153 [5835].
LV Nor = CoD−50°9816 (10) = CPD −50°8564 (9.7) = BV 1214 [5904].
LW Nor = КЗП 7315 = S 5723 [4001].
BN Oct = КЗП 8569 = S 7096 [4001].
BO Oct = HR 8481 = CoD−81°831 (5.6) = = CPD−81°995 (6.6) = SAO 258928 = = HD 210967 (Mb) = BV 792 [5599].
V2045 Oph = 2 [5159].
V2046 Oph = 349.1933 [0158] = P 1198 = = КЗП 2983.
V2047 Oph = 761.1933 [0205] = P 1200 = = КЗП 2989.
V2048 Oph = 66 Oph [4971] = HR 6712 = = BD+4°3570 (5.3) = = SAO 123005 = HD 164284 (B3) = = КЗП 4741.
V918 Ori = 48 [5603].
V919 Ori = 1 [5603], *Pigatto*.
V920 Ori = 2 [5603], *Pigatto*.
V921 Ori = 56 [5603].
V922 Ori = 3 [5603], *Pigatto*.
V923 Ori = 4 [5603], *Pigatto*.
V924 Ori = 59 [5603], Not far from V539 Ori.
V925 Ori = S 10655 [5884].
V926 Ori = П 981−6 [5603], *Pigatto*.
V927 Ori = 60 [5603]. Not far from V710 Ori.
V928 Ori = 7 [5603], *Pigatto*.
V929 Ori = 52 [5603].
V930 Ori = 51 [5603].
V931 Ori = 9 [5603]. *Pigatto*.

V932 Ori = 43 [5603], *Pigatto.* Not far from V747 Ori.
V933 Ori = 10 [5603], *Pigatto.* Near V748 Ori.
V934 Ori = 11 [5603], *Pigatto.* To the north of V751 Ori.
V935 Ori = 53 [5603]. Near V750 Ori.
V936 Ori = 12 [5603], *Pigatto.*
V937 Ori = 13 [5603], *Pigatto.* Not far from XX Ori.
V938 Ori = П 1555 = 57 [5603]. Near XX Ori.
V939 Ori = П 1573 = 42 [5603]. Near КЗП 6232.
V940 Ori = 14 [5603], *Pigatto.*
V941 Ori = 50 [5603].
V942 Ori = 16 [5603], *Pigatto.*
V943 Ori = 19 [5603], *Pigatto.*
V944 Ori = S 10659 [5884].
V945 Ori = 45 [5603].
V946 Ori = 20 [5603], *Pigatto.* Not far from AQ Ori.
V947 Ori = П 2235 = 22 [5603], *Pigatto.*
V948 Ori = 25 [5603] = 40 [5603], *Pigatto.*
V949 Ori = 46 [5603].
V950 Ori = 26 [5603], *Pigatto.*
V951 Ori = КЗП 6325 = 125 [2849] = = 29 [5603, *Pigatto*].
V952 Ori = 30 [5603]. *Pigatto.* Near NGC 1999 and V844 Ori.
V953 Ori = 33 [5603], *Pigatto.*
V954 Ori = 35 [5603], *Pigatto.*
V955 Ori = 36 [5603], *Pigatto.*
V956 Ori = 39 [5603], *Pigatto*. Not far from V597 Ori.
V957 Ori = 37 [5603], *Pigatto.*
V958 Ori = П 2961 = 58 [5603].
V959 Ori = S 10661 [5884].
V960 Ori = 38 [5603], *Pigatto.*
V961 Ori = 54 [5603].
V962 Ori = Zi 478 = КЗП 673 = Ross 7 [5905] = S 10662 [5884].
V963 Ori = BD + 20°1369 (8.3) = = SAO 78223 = HD 43837 (B) [5838].
MX Pav = CPD − 64°3890 (10.0) = = BV 1162 [5835].
MY Pav = КЗП 4130 = S 5046 [0085, 4001] = BV 1292 [5834].
MZ Pav = КЗП 4532 = S 5061 [0085] = = BV 1294 [5834].
NN Pav = КЗП 4553 = Melb ph −66°19^{h}12^m № 154 [5906] = = BV 1298 [5834].
NO Pav = КЗП 4886 = S 5094 [0085] = = BV 1301 [5834].
NP Pav = КЗП 5263 = S 5117 [0085] = = BV 1305 [5834].
NQ Pav = КЗП 8564 = S 7093 [4001].
NR Pav = КЗП 8567 = S 7095 [4001].
NS Pav = КЗП 8600 = S 7102 [4001].
τ Peg = 62 Peg [5907] = HR 8880 = = BD + 22°4810 (5.0) = SAO 91186 = = HD 220061 (A5).
V382 Per = GR 181 [5849].
V383 Per = BD + 33°578 (7.7) = SAO 56158 = = HD 19216 (B9) [5390].
V384 Per = DO 27089 (N) = CIT 5 [5908] = = IRC + 50096 = СПЗ 1809.
V385 Per = S 10626 [5884].
V386 Per = HR 1223 [5500] = BD + 34°773 (7.0) = SAO 56847 = = HD 24809 (A5).
V387 Per = S 10641 [5884].
V388 Per = S 10643 [5884].

V389 Per = S 10645 [5884].
V390 Per = S 10650 [5884].
V391 Per = S 10651 [5884].
V392 Per = S 10653 [5884]. Southern component of a very close binary system.
ι Phe [5859] = CoD–43°15420 (4.5) = = CPD–43°9758 (5.4) = = SAO 231675 = HD221760 (A2p) [5880] = Zi 2148 = КЗП 102269.
SV Pic = CoD–52°966 (9.4) = CPD –52°548 (9.3) = HD 29906 (Mb) [5828].
SW Pic = HR 2151 [5840] = CoD –60°1336 (6.5) = CPD–60°537 (7.9) = = SAO 249424 = HD 41586 (Ma).
MW Pup = CoD–44°3871 (9.3) = CPD –44°2021 (8.8) = SAO 219162 = = HD 65293 (A0) = BV 1095 [5857].
MX Pup = r Pup = HR 3237 [5909] = CoD– –35°4349 (5.3) = CPD–35°2058 (4.7) = = SAO 198957 = HD 68980 (B3p) = = КЗП 6622.
SX Ret = CoD–60°361 (9.4) = CPD –60°294 (9.4) = = HD 26431 (Ma) [5828] = КЗП 387 = = S 4830 [0085].
SY Ret = CoD–67°241 (9.8) = CPD –67°301 (9.8) = HD 27443 (Ma) [5828].
GX Sge = СПЗ 1673 = TTV–1 [5910].
GY Sge = BD+18°4139 (9.4) = СПЗ 1674 = = TTV–2 [5910].
GZ Sge = СПЗ 1676 [5911].
V2618 Sgr = 1 [5869].
V2619 Sgr = 4 [5869].
V2620 Sgr = 3 [5869].
V2621 Sgr = 5 [5869].
V2622 Sgr = 6 [5869].
V2623 Sgr = 8 [5869].
V2624 Sgr = 7 [5869].
V2625 Sgr = 9 [5869].
V2626 Sgr = 12 [5869].
V2627 Sgr = 13 [5869].
V2628 Sgr = 14 [5869].
V2629 Sgr = 16 [5869]
V2630 Sgr = 15 [5869].
V2631 Sgr = 17 [5869].
V2632 Sgr = 18 [5869].
V2633 Sgr = 20 [5869].
V2634 Sgr = 21 [5869].
V2635 Sgr = 24 [5869].
V2636 Sgr = 23 [5869].
V2637 Sgr = 32 [5869].
V2638 Sgr = P 1513 = 620.1933 [2926] = = КЗП 3849 = HV 9295 = 25 [5869].
V2639 Sgr = 31 [5869].
V2640 Sgr = 30 [5869].
V2641 Sgr = 27 [5869].
V2642 Sgr = 29 [5869].
V2643 Sgr = 33 [5869].
V2644 Sgr = 35 [5869].
V2645 Sgr = 41 [5869].
V2646 Sgr = 40 [5869].
V2647 Sgr = 34 [5869].
V2648 Sgr = 39 [5869].
V2649 Sgr = 42 [5869].
V2650 Sgr = 38 [5869].
V2651 Sgr = 43 [5869].
V2652 Sgr = P 1516 = 621.1933 [2926] = = КЗП 3852 = HV 9296 = 45 [5869].
V2653 Sgr = P 1519 = 622.1933 [2926] = = КЗП 3853 = HV 9297 = 44 [5869].
V2654 Sgr = 47 [5869].
V2655 Sgr = 46 [5869].
V2656 Sgr = 49 [5869].

V2657 Sgr = 56 [5869].
V2658 Sgr = 48 [5869].
V2659 Sgr = 51 [5869].
V2660 Sgr = P1520 = 623.1933 [2926] = =КЗП 3856 = HV 9299 = 52 [5869].
V2661 Sgr = 58 [5869].
V2662 Sgr = 53 [5869].
V2663 Sgr = 63 [5869].
V2664 Sgr = 59 [5869].
V2665 Sgr = 60 [5869].
V2666 Sgr = 62 [5869].
V2667 Sgr = 64 [5869].
V2668 Sgr = 61 [5869].
V2669 Sgr = 65 [5869].
V2670 Sgr = 67 [5869].
V2671 Sgr = 66 [5869].
V2672 Sgr = P1524 = 627.1933 [2926] = = КЗП 3861 = HV 9303 = 70 [5869].
V2673 Sgr = P1522 = 625.1933 [2926] = = КЗП 3860 = HV 9301 = 72 [5869].
V2674 Sgr = 68 [5869].
V2675 Sgr = 69 [5869].
V2676 Sgr = 74 [5869].
V2677 Sgr = 73 [5869].
V2678 Sgr = 76 [5869].
V2679 Sgr = 79 [5869].
V2680 Sgr = 75 [5869].
V2681 Sgr = 78 [5869].
V2682 Sgr = 77 [5869].
V2683 Sgr = 81 [5869].
V2684 Sgr = 80 [5869].
V2685 Sgr = 86 [5869].
V2686 Sgr = 90 [5869].
V2687 Sgr = 89 [5869].
V2688 Sgr = 85 [5869].
V2689 Sgr = 87 [5869].
V2690 Sgr = 93 [5869].
V2691 Sgr = 88 [5869].
V2692 Sgr = 98 [5869].
V2693 Sgr = P4586 = 3871 = HV7303 [0251] = = 100 [5869].
V2694 Sgr = 91 [5869].
V2695 Sgr = 99 [5869].
V2696 Sgr = 97 [5869].
V2697 Sgr = 95 [5869].
V2698 Sgr = P1528 = 630.1933 [2926] = = КЗП 3873 = HV 9308 = = 94 [5869].
V2699 Sgr = 103 [5869].
V2700 Sgr = 101 [5869].
V2701 Sgr = 102 [5869].
V2702 Sgr = 108 [5869].
V2703 Sgr = 105 [5869].
V2704 Sgr = 107 [5869].
V2705 Sgr = 111 [5869].
V2706 Sgr = 113 [5869]. Near КЗП 3876.
V2707 Sgr = 110 [5869].
V2708 Sgr = 117 [5869].
V2709 Sgr = 114 [5869].
V2710 Sgr = 126 [5869].
V2711 Sgr = 115 [5869]. Near КЗП 3874.
V2712 Sgr = 118 [5869].
V2713 Sgr = 119 [5869].
V2714 Sgr = 122 [5869].
V2715 Sgr = 120 [5869].
V2716 Sgr = 129 [5869].
V2717 Sgr = 135 [5869].
V2718 Sgr = 133 [5869].
V2719 Sgr = P1530 = 632.1933 [2926] = = КЗП 3876 = HV 9312 = = 124 [5869].
V2720 Sgr = 125 [5869].
V2721 Sgr = 127 [5869].
V2722 Sgr = 130 [5869].
V2723 Sgr = 131 [5869].
V2724 Sgr = 134 [5869].

V2725 Sgr = 138 [5869].
V2726 Sgr = 137 [5869].
V2727 Sgr = 140 [5869].
V2728 Sgr = 145 [5869].
V2729 Sgr = 144 [5869].
V2730 Sgr = 142 [5869].
V2731 Sgr = P1533 = 634.1933 [2926] = = КЗП 3882 = HV 9317 = = 143 [5869].
V2732 Sgr = 147 [5869].
V2733 Sgr = 149 [5869]. Not far from КЗП 3884.
V2734 Sgr = 152 [5869]. Not far from V684 Sgr.
V2735 Sgr = 148 [5869].
V2736 Sgr = 146 [5869].
V2737 Sgr = 155 [5869].
V2738 Sgr = 154 [5869].
V2739 Sgr = 159 [5869].
V2740 Sgr = 153 [5869].
V2741 Sgr = 157 [5869].
V2742 Sgr = 158 [5869].
V2743 Sgr = 165 [5869].
V2744 Sgr = 161 [5869].
V2745 Sgr = 160 [5869].
V2746 Sgr = 163 [5869].
V2747 Sgr = 162 [5869].
V2748 Sgr = 171 [5869].
V2749 Sgr = 164 [5869].
V2750 Sgr = 173 [5869].
V2751 Sgr = 174 [5869].
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V3331 Sgr = 885 [5869].
V3332 Sgr = 887 [5869]. Not far from КЗП 4084.
V3333 Sgr = 888 [5869].
V3334 Sgr = 890 [5869].
V3335 Sgr = 893 [5869].
V3336 Sgr = 889 [5869].
V3337 Sgr = 894 [5869].
V3338 Sgr = 892 [5869].
V3339 Sgr = 897 [5869].
V3340 Sgr = 900 [5869].
V3341 Sgr = 895 [5869].
V3342 Sgr = 899 [5869].
V3343 Sgr = 896 [5869].
V3344 Sgr = 898 [5869].
V3345 Sgr = 901 [5869].
V3346 Sgr = 902 [5869].
V3347 Sgr = 904 [5869].
V3348 Sgr = 903 [5869].
V3349 Sgr = 906 [5869].
V3350 Sgr = 909 [5869].
V3351 Sgr = 908 [5869].
V3352 Sgr = 911 [5869].
V3353 Sgr = 912 [5869].
V3354 Sgr = 913 [5869].
V3355 Sgr = 915 [5869].
V3356 Sgr = 919 [5869].
V3357 Sgr = 916 [5869].
V3358 Sgr = 918 [5869].
V3359 Sgr = 922 [5869]. Not far from V1880 Sgr.
V3360 Sgr = 926 [5869].
V3361 Sgr = 917 [5869].
V3362 Sgr = 920 [5869].
V3363 Sgr = 925 [5869].
V3364 Sgr = 924 [5869].
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V3367 Sgr = 929 [5869].
V3368 Sgr = 930 [5869].
V3369 Sgr = 932 [5869].
V3370 Sgr = 934 [5869].
V3371 Sgr = 935 [5869].
V3372 Sgr = 931 [5869]. Not far from V1192 Sgr.
V3373 Sgr = 936 [5869].

V3374 Sgr = 938 [5869].
V3375 Sgr = 942 [5869].
V3376 Sgr = 939 [5869].
V3377 Sgr = 941 [5869].
V3378 Sgr = 940 [5869].
V3379 Sgr = 947 [5869].
V3380 Sgr = 943 [5869].
V3381 Sgr = 945 [5869].
V3382 Sgr = 949 [5869].
V3383 Sgr = 944 [5869].
V3384 Sgr = 948 [5869].
V3385 Sgr = 951 [5869].
V3386 Sgr = 952 [5869].
V3387 Sgr = 957 [5869].
V3388 Sgr = 953 [5869].
V3389 Sgr = 954 [5869].
V3390 Sgr = 955 [5869].
V3391 Sgr = 958 [5869].
V3392 Sgr = 956 [5869].
V3393 Sgr = 960 [5869].
V3394 Sgr = 959 [5869].
V3395 Sgr = 963 [5869].
V3396 Sgr = 965 [5869].
V3397 Sgr = 969 [5869].
V3398 Sgr = 967 [5869].
V3399 Sgr = 966 [5869].
V3400 Sgr = 968 [5869].
V3401 Sgr = 973 [5869].
V3402 Sgr = 971 [5869].
V3403 Sgr = 972 [5869].
V3404 Sgr = 970 [5869].
V3405 Sgr = 976 [5869].
V3406 Sgr = 975 [5869].
V3407 Sgr = 977 [5869].
V3408 Sgr = 979 [5869].
V3409 Sgr = 980 [5869].
V3410 Sgr = 981 [5869].
V3411 Sgr = 983 [5869].
V3412 Sgr = 986 [5869].
V3413 Sgr = 985 [5869].
V3414 Sgr = 982 [5869].
V3415 Sgr = 987 [5869].
V3416 Sgr = 984 [5869].
V3417 Sgr = 991 [5869].
V3418 Sgr = 993 [5869]. Probably identical with КЗП 4120.
V3419 Sgr = 990 [5869].
V3420 Sgr = 996 [5869].
V3421 Sgr = 995 [5869].
V3422 Sgr = 997 [5869].
V3423 Sgr = 999 [5869].
V3424 Sgr = 1000 [5869].
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V3426 Sgr = 1003 [5869].
V3427 Sgr = 1002 [5869].
V3428 Sgr = 1007 [5869].
V3429 Sgr = 1008 [5869].
V3430 Sgr = 1012 [5869].
V3431 Sgr = 1005 [5869].
V3432 Sgr = 1009 [5869].
V3433 Sgr = 1011 [5869].
V3434 Sgr = 1014 [5869]. Not far from КЗП 4128.
V3435 Sgr = 1016 [5869]. 3′ from V2351 Sgr.
V3436 Sgr = 1017 [5869].
V3437 Sgr = 1019 [5869]. Probably identical with КЗП 4128.
V3438 Sgr = 1022 [5869].
V3439 Sgr = 1021 [5869].
V3440 Sgr = 1020 [5869].
V3441 Sgr = 1026 [5869].
V3442 Sgr = 1024 [5869].
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V3445 Sgr = 1034 [5869].
V3446 Sgr = 1029 [5869]

V3447 Sgr = 1027 [5869].
V3448 Sgr = 1035 [5869].
V3449 Sgr = 1036 [5869].
V3450 Sgr = 1032 [5869].
V3451 Sgr = 1038 [5869].
V3452 Sgr = 1037 [5869].
V3453 Sgr = 1039 [5869].
V3454 Sgr = 1040 [5869].
V3455 Sgr = 1044 [5869].
V3456 Sgr = 1042 [5869].
V3457 Sgr = 1045 [5869].
V3458 Sgr = 1043 [5869].
V3459 Sgr = 1046 [5869].
V3460 Sgr = 1050 [5869].
V3461 Sgr = 1052 [5869].
V3462 Sgr = Zi 1403 = КЗП 4136 = = Innes 114 [2933] = 1047 [5869].
V3463 Sgr = 1051 [5869].
V3464 Sgr = 1054 [5869].
V3465 Sgr = 1053 [5869].
V3466 Sgr = 1057 [5869].
V3467 Sgr = 1056 [5869].
V3468 Sgr = 1055 [5869].
V3469 Sgr = 1059 [5869].
V3470 Sgr = 1058 [5869].
V3471 Sgr = 1061 [5869].
V3472 Sgr = 1060 [5869].
V3473 Sgr = 1064 [5869].
V3474 Sgr = 1062 [5869].
V3475 Sgr = 1063 [5869]. Not far from V2355 Sgr.
V3476 Sgr = Zi 1405 = КЗП 4146 = = Innes 12 [1613] = 1065 = [5869].
V3477 Sgr = 1067 [5869].
V3478 Sgr = 1069 [5869].
V3479 Sgr = 1073 [5869].
V3480 Sgr = 1070 [5869]. Not far from V2355 Sgr.
V3481 Sgr = 1076 [5869].
V3482 Sgr = 1072 [5869].
V3483 Sgr = 1077 [5869].
V3484 Sgr = 1074 [5869].
V3485 Sgr = 1078 [5869].
V3486 Sgr = 1080 [5869].
V3487 Sgr = 1082 [5869].
V3488 Sgr = 1083 [5869].
V3489 Sgr = 1079 [5869].
V3490 Sgr = 1081 [5869].
V3491 Sgr = 1087 [5869].
V3492 Sgr = 1084 [5869].
V3493 Sgr = 1088 [5869].
V3494 Sgr = 1086 [5869].
V3495 Sgr = 1093 [5869].
V3496 Sgr = 1091 [5869].
V3497 Sgr = 1090 [5869].
V3498 Sgr = 1094 [5869].
V3499 Sgr = 1095 [5869].
V3500 Sgr = 1097 [5869].
V3501 Sgr = 1100 [5869].
V3502 Sgr = 1096 [5869].
V3503 Sgr = 1103 [5869].
V3504 Sgr = 1099 [5869].
V3505 Sgr = 1101 [5869].
V3506 Sgr = 1104 [5869].
V3507 Sgr = 1105 [5869].
V3508 Sgr = BD – 19°5036 (8.4) = CPD –19°6881 (7.8) = SAO 161562 = = HD 170682 (B8) [5914].
V3509 Sgr = 1108 [5869].
V3510 Sgr = 1109 [5869].
V3511 Sgr = 1111 [5869].
V3512 Sgr = 1113 [5869].
V3513 Sgr = 1112 [5869].
V3514 Sgr = 1110 [5869].

V3515 Sgr = 1114 [5869].
V3516 Sgr = 1115 [5869].
V3517 Sgr = 1116 [5869].
V3518 Sgr = 1119 [5869]. Near V2579 Sgr.
V3519 Sgr = 1120 [5869].
V3520 Sgr = 1126 [5869].
V3521 Sgr = 1117 [5869].
V3522 Sgr = 1122 [5869].
V3523 Sgr = 1128 [5869].
V3524 Sgr = 1131 [5869].
V3525 Sgr = 1127 [5869].
V3526 Sgr = 1132 [5869].
V3527 Sgr = 1133 [5869].
V3528 Sgr = 1134 [5869].
V3529 Sgr = 1135 [5869].
V3530 Sgr = 1138 [5869].
V3531 Sgr = 1137 [5869]. Not far from V1625 Sgr.
V3532 Sgr = 1140 [5869].
V3533 Sgr = 1142 [5869].
V3534 Sgr = 1143 [5869].
V3535 Sgr = 1145 [5869].
V3536 Sgr = 1141 [5869].
V3537 Sgr = 1147 [5869].
V3538 Sgr = 1144 [5869].
V3539 Sgr = 1146 [5869].
V3540 Sgr = 1148 [5869].
V3541 Sgr = 1149 [5869]. Near V936 Sgr.
V3542 Sgr = 1150 [5869].
V3543 Sgr = 1152 [5869].
V3544 Sgr = 1153 [5869].
V3545 Sgr = 1157 [5869].
V3546 Sgr = Zi 1418 = КЗП 4172 = = Innes 18 [1613] = 1156 [5869].
V3547 Sgr = 1159 [5869].
V3548 Sgr = 1155 [5869].
V3549 Sgr = 1158 [5869].
V3550 Sgr = 1160 [5869].
V3551 Sgr = 1161 [5869]. Near КЗП 4173.
V3552 Sgr = 1163 [5869].
V3553 Sgr = 1162 [5869].
V3554 Sgr = 1165 [5869].
V3555 Sgr = 1166 [5869].
V3556 Sgr = 1169 [5869].
V3557 Sgr = 1167 [5869]. Not far from КЗП 4173.
V3558 Sgr = 1174 [5869].
V3559 Sgr = 1171 [5869].
V3560 Sgr = 1172 [5869].
V3561 Sgr = 1173 [5869].
V3562 Sgr = 1177 [5869].
V3563 Sgr = 1176 [5869].
V3564 Sgr = 1178 [5869].
V3565 Sgr = 1180 [5869].
V3566 Sgr = 1181 [5869].
V3567 Sgr = 1182 [5869].
V3568 Sgr = 1184 [5869].
V3569 Sgr = 1183 [5869].
V3570 Sgr = 1185 [5869].
V3571 Sgr = 1188 [5869].
V3572 Sgr = 1189 [5869].
V3573 Sgr = 1190 [5869].
V3574 Sgr = 1194 [5869].
V3575 Sgr = 1195 [5869].
V3576 Sgr = 1197 [5869].
V3577 Sgr = 1193 [5869].
V3578 Sgr = 1198 [5869].
V3579 Sgr = 1200 [5869].
V3580 Sgr = 1202 [5869].
V3581 Sgr = 1199 [5869].
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V3584 Sgr = 1205 [5869].
V3585 Sgr = 1206 [5869].
V3586 Sgr = 1207 [5869].

V3587 Sgr = 1208 [5869].
V3588 Sgr = 1212 [5869].
V3589 Sgr = 1210 [5869].
V3590 Sgr = 1209 [5869].
V3591 Sgr = 1216 [5869].
V3592 Sgr = 1218 [5869].
V3593 Sgr = 1219 [5869].
V3594 Sgr = 1213 [5869].
V3595 Sgr = 1214 [5869].
V3596 Sgr = 1215 [5869].
V3597 Sgr = 1217 [5869].
V3598 Sgr = 1220 [5869].
V3599 Sgr = 1222 [5869].
V3600 Sgr = 1221 [5869].
V3601 Sgr = 1223 [5869].
V3602 Sgr = 1228 [5869].
V3603 Sgr = 1225 [5869]. Near V1198 Sgr.
V3604 Sgr = 1230 [5869].
V3605 Sgr = 1226 [5869].
V3606 Sgr = P 4758 = 555.1935 [2935] = = КЗП 4201 = HV 9471 = = 1227 [5869].
V3607 Sgr = 1229 [5869].
V3608 Sgr = 1233 [5869].
V3609 Sgr = 1234 [5869].
V3610 Sgr = 1236 [5869].
V3611 Sgr = 1241 [5869].
V3612 Sgr = 1237 [5869].
V3613 Sgr = 1238 [5869].
V3614 Sgr = 1242 [5869].
V3615 Sgr = 1244 [5869].
V3616 Sgr = 1243 [5869].
V3617 Sgr = 1245 [5869].
V3618 Sgr = 1247 [5869].
V3619 Sgr = 1248 [5869].
V3620 Sgr = 1250 [5869].
V3621 Sgr = 1246 [5869].
V3622 Sgr = 1249 [5869].
V3623 Sgr = 1255 [5869].
V3624 Sgr = 1254 [5869].
V3625 Sgr = 1251 [5869].
V3626 Sgr = 1257 [5869].
V3627 Sgr = 1253 [5869].
V3628 Sgr = 1256 [5869].
V3629 Sgr = 1260 [5869].
V3630 Sgr = 1261 [5869].
V3631 Sgr = 1258 [5869].
V3632 Sgr = 1263 [5869].
V3633 Sgr = 1265 [5869].
V3634 Sgr = 1264 [5869]. Probably identical with КЗП 4217.
V3635 Sgr = 1266 [5869].
V3636 Sgr = CPD – 35°8082 (9.8) = = Zi 1435 = КЗП 4219 = = Innes 31 [1613] = 1268 = [5869].
V3637 Sgr = 1269 [5869].
V3638 Sgr = 1267 [5869].
V3639 Sgr = 1270 [5869].
V3640 Sgr = 1271 [5869].
V3641 Sgr = 1272 [5869].
V3642 Sgr = 1275 [5869].
V3643 Sgr = 1282 [5869].
V3644 Sgr = 1279 [5869].
V3645 Sgr = Nova Sgr 1970 [5915] = = СПЗ 1728.
V3646 Sgr = 1281 [5869].
V3647 Sgr = 1280 [5869].
V3648 Sgr = 1283 [5869].
V3649 Sgr = 1285 [5869].
V3650 Sgr = 1288 [5869].
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V3653 Sgr = 1291 [5869].
V3654 Sgr = 1292 [5869].
V3655 Sgr = 1293 [5869].

V3656 Sgr = 1294 [5869].
V3657 Sgr = 1295 [5869].
V3658 Sgr = 1297 [5869].
V3659 Sgr = 1303 [5869].
V3660 Sgr = 1298 [5869].
V3661 Sgr = 1299 [5869].
V3662 Sgr = 1300 [5869].
V3663 Sgr = 1301 [5869].
V3664 Sgr = 1305 [5869].
V3665 Sgr = 1302 [5869].
V3666 Sgr = 1307 [5869].
V3667 Sgr = 1306 [5869].
V3668 Sgr = 1309 [5869].
V3669 Sgr = 1315 [5869].
V3670 Sgr = 1310 [5869].
V3671 Sgr = 1312 [5869].
V3672 Sgr = 1313 [5869]. Near V442 Sgr.
V3673 Sgr = 1314 [5869].
V3674 Sgr = 1316 [5869].
V3675 Sgr = 1319 [5869].
V3676 Sgr = 1318 [5869].
V3677 Sgr = 1320 [5869].
V3678 Sgr = 1322 [5869].
V3679 Sgr = 1321 [5869].
V3680 Sgr = 1323 [5869].
V3681 Sgr = 1327 [5869].
V3682 Sgr = 1324 [5869].
V3683 Sgr = 1326 [5869].
V3684 Sgr = P4775 = 560.1935 [2935] = КЗП 4241 = HV 9483 = 1328 [5869].
V3685 Sgr = 1325 [5869].
V3686 Sgr = 1330 [5869].
V3687 Sgr = 1335 [5869].
V3688 Sgr = 1331 [5869].
V3689 Sgr = 1333 [5869].
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V3691 Sgr = 1339 [5869].
V3692 Sgr = 1343 [5869].
V3693 Sgr = 1346 [5869].
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V3695 Sgr = 1348 [5869].
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V3698 Sgr = 1355 [5869].
V3699 Sgr = 1353 [5869].
V3700 Sgr = 1359 [5869].
V3701 Sgr = 1357 [5869].
V3702 Sgr = 1358 [5869].
V3703 Sgr = 1360 [5869].
V3704 Sgr = 1365 [5869].
V3705 Sgr = 1363 [5869].
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V3707 Sgr = 1368 [5869].
V3708 Sgr = 1367 [5869].
V3709 Sgr = 1366 [5869].
V3710 Sgr = 1369 [5869].
V3711 Sgr = 1371 [5869].
V3712 Sgr = 1370 [5869].
V3713 Sgr = 1373 [5869].
V3714 Sgr = 1377 [5869].
V3715 Sgr = 1374 [5869].
V3716 Sgr = 1386 [5869].
V3717 Sgr = 1381 [5869].
V3718 Sgr = $18^h33^m07^s -21°14'.2$ (1900.0) [5916].
V3719 Sgr = 1380 [5869].
V3720 Sgr = 1385 [5869].
V3721 Sgr = 1383 [5869].
V3722 Sgr = 1382 [5869].
V3723 Sgr = 1388 [5869].
V3724 Sgr = 1384 [5869].
V3725 Sgr = 1387 [5869].
V3726 Sgr = 1390 [5869].
V3727 Sgr = 1392 [5869].
V3728 Sgr = 1391 [5869].
V3729 Sgr = 1395 [5869].

V3730 Sgr = 1393 [5869].
V3731 Sgr = 1397 [5869].
V3732 Sgr = 1399 [5869].
V3733 Sgr = 1396 [5869].
V3734 Sgr = 1398 [5869].
V3735 Sgr = 1400 [5869].
V3736 Sgr = 1401 [5869].
V3737 Sgr = 1402 [5869].
V3738 Sgr = 1403 [5869].
V3739 Sgr = 1405 [5869].
V3740 Sgr = 1408 [5869].
V3741 Sgr = 1404 [5869].
V3742 Sgr = 1406 [5869]. Probably identical with КЗП 4275.
V3743 Sgr = 1407 [5869].
V3744 Sgr = 1410 [5869].
V3745 Sgr = 1412 [5869].
V3746 Sgr = 1414 [5869].
V3747 Sgr = 1409 [5869].
V3748 Sgr = 1416 [5869].
V3749 Sgr = 1413 [5869].
V3750 Sgr = 1411 [5869].
V3751 Sgr = 1415 [5869]. Not far from V1154 Sgr.
V3752 Sgr = 1418 [5869].
V3753 Sgr = 1419 [5869].
V3754 Sgr = 1421 [5869].
V3755 Sgr = 1425 [5869].
V3756 Sgr = 1426 [5869].
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V3761 Sgr = 1435 [5869].
V3762 Sgr = 1436 [5869].
V3763 Sgr = 1437 [5869].
V3764 Sgr = 1439 [5869].
V3765 Sgr = Zi 1467 = КЗП 4280 = = Innes 45 [1613] = 1440 [5869].
V3766 Sgr = 1442 [5869].
V3767 Sgr = 1443 [5869].
V3768 Sgr = 1441 [5869].
V3769 Sgr = 1445 [5869].
V3770 Sgr = 1446 [5869].
V3771 Sgr = 1447 [5869].
V3772 Sgr = 1448 [5869].
V3773 Sgr = 1449 [5869].
V3774 Sgr = 1453 [5869].
V3775 Sgr = 1452 [5869].
V3776 Sgr = 1454 [5869].
V3777 Sgr = 1455 [5869].
V3778 Sgr = 1457 [5869].
V3779 Sgr = 1458 [5869].
V3780 Sgr = 1460 [5869].
V3781 Sgr = 1463 [5869].
V3782 Sgr = 1467 [5869].
V3783 Sgr = 1464 [5869].
V3784 Sgr = 1466 [5869].
V3785 Sgr = 1465 [5869].
V3786 Sgr = 1469 [5869].
V3787 Sgr = $18^h38^m24^s$ $-20°22\overset{'}{.}2$ (1900.0) [5917].
V3788 Sgr = 1 [5870].
V3789 Sgr = P 4942 = КЗП 4474 = = СПЗ 621 [1659] = = MMO 50 [4231].
V3790 Sgr = BD−16°5351 (8.0) = = SAO 162748 = HD 184077 (Ma) [5918].
V855 Sco = СПЗ 1677 [5919].
V856 Sco = HR 6000 = CoD−38°10894 (7.0) = = CPD−38°6374 (7.5) = = SAO 207368 = HD 144667 (A0) = = BV 880 [5579].
V857 Sco = СПЗ 1687 [5690].
V858 Sco = СПЗ 1686 [5690].
V859 Sco = СПЗ 1682 [5690].
V860 Sco = СПЗ 1680 [5690].

V861 Sco = HR 6283 = CoD−40°10975 (6.5) = = CPD−40°7639 (7.2) = SAO227473 = = HD 152667 (B0) [5920, 4981, 5921] = КЗП 7538 = BV755 [4655].

V862 Sco = CoD−32°13086 (7.2) = CPD −32°4704 (7.2) = SAO 209105 = = HD 160202 (B8) [5922].

WW Scl = SB 31 [5923]; the data on SB 31 are given in [5887].

WX Scl = SB 338 [5923]; the data on SB 338 are given in [5887].

WY Scl = CoD−28°307 (10) = No. 248 Region II, Plate III [5924] = = BV 626 [5843].

WZ Scl = HR 431 [5925] = CoD−34°576(6.7) = = CPD−34°141 (6.6) = SAO 193136 = = HD 9065 (A3).

XX Scl = CoD−33°541 (8.3) = CPD −33°149 (8.2) = SAO 193142 = = HD 9133 (F0) [5925].

V370 Sct = $18^h43^m11^s$−5°49.'1 (1900.0) [5926].

FI Ser = BD+0°3322 (8.1) = SAO 120910 = = HD 135297 (A0p) = КЗП 7176 = = Babcock 54 [4170].

FK Ser = BD−10°4662 (9.5) = $18^h19^m.9$ − −10°14' (1900.0) [5927] *Kirszenberg.*

δ Ser = 13 Ser [5511] = HR 5788/9 [5903] = = BD+11°2821 (3.3) = SAO 101623/4 = = HD 138917 (F0) = ADS 9701. The variable is probably the brighter component.

V425 Tau = Plf 215 [5928] = СПЗ 1810.

V426 Tau = Plf 177 [5928] = СПЗ 1811.

V427 Tau = Plf 204 = 52 [5929].

V428 Tau = Plf 188 = 42 [5929].

V429 Tau = Plf 210 = 3 [5930].

V430 Tau = Plf 181 = 35 [5929].

V431 Tau = Plf 205 = 2 [5930].

V432 Tau = Plf 172 = 32 [5929].

V433 Tau = Plf 174 [5928] = СПЗ 1813.

V434 Tau = Plf 168 [5928] = СПЗ 1814.

V435 Tau = Plf 173 [5928] = СПЗ 1815.

V436 Tau = Plf 167 [5928] = СПЗ 1816.

V437 Tau = Plf 170 [5928] = СПЗ 1817.

V438 Tau = Plf 179 [5928] = СПЗ 1818.

V439 Tau = Plf 217 [5928] = СПЗ 1819.

V440 Tau = Plf 184 = 38 [5929].

V441 Tau = Plf 196 [5928] = СПЗ 1820.

V442 Tau = Plf 202 [5928] = СПЗ 1821.

V443 Tau = Plf 203 [5928] = СПЗ 1822.

V444 Tau = Plf 197 = 47 [5929].

V445 Tau = Plf 218 [5928] = СПЗ 1823.

V446 Tau = Plf 212 [5928] = СПЗ 1824.

V447 Tau = Plf 206 [5928] = СПЗ 1825 = = H II 1038.

V448 Tau = Plf 195 = 1 [5930].

V449 Tau = Plf 200 [5928] = СПЗ 1826.

V450 Tau = СПЗ 1628 [5836].

V451 Tau = Plf 175 = 33 [5929].

V452 Tau = Plf 180 [5928] = СПЗ 1828 = = Plf 221 [5928] = СПЗ 1827.

V453 Tau = Plf 187 = 40 [5929].

V454 Tau = Plf 220 [5928] = СПЗ 1829.

V455 Tau = Plf 199 [5928] = СПЗ 1830.

V456 Tau = Plf 209 [5928] = СПЗ 1831.

V457 Tau = Plf 186 = 39 [5929].

V458 Tau = Plf 194 [5928] = СПЗ 1832.

V459 Tau = Plf 198 = 48 [5929].

V460 Tau = Plf 185 [5928] = СПЗ 1833.

V461 Tau = Plf 207 [5928] = СПЗ 1834.

V462 Tau = Plf 193 [5928] = СПЗ 1835.

V463 Tau = Plf 192 [5928] = СПЗ 1836.

V464 Tau = Plf 211 [5928] = СПЗ 1837.

V465 Tau = Plf 176 = 34 [5929].

V466 Tau = Plf 219 [5928] = СПЗ 1838.
V467 Tau = Plf 189 = 45 [5929].
V468 Tau = Plf 208 [5928] = СПЗ 1839. Near H Tau.
V469 Tau = Plf 214 [5928] = СПЗ 1840.
V470 Tau = Plf 213 [5928] = СПЗ 1841.
V471 Tau = BD + 16°516 (9.2) [5931].
V472 Tau = Plf 191 [5928] = СПЗ 1842.
V473 Tau = BD+29°742 (7.0) = SAO 76771 = = HD 30466 (A0p) = КЗП 6135 = = Babcock 17 [4170, 5896].
V474 Tau = Plf 171 [5928] = СПЗ 1844.
V475 Tau = Plf 201 = 50 [5929].
V476 Tau = Plf 216 [5928] = СПЗ 1845. Near V392 Tau.
V477 Tau = Plf 182 = 36 [5929].
V478 Tau = Plf 178 [5928] = СПЗ 1846. Near SX Tau.
V479 Tau = BD+4°601 (8.0) = = SAO 111492 = ADS 2849 A = = HD 24550 (F0) [5932].
V480 Tau = 97 Tau = HR 1547 [5830] = = BD+18°743 (4.5) = SAO 94164 = = HD 30780 (F0). Hyades member.
V481 Tau = Plf 183 = 37 [5929].
V482 Tau = BD+26°698 (9.4) = HD 283481 (M0) = DO 10338 (M6) = = СПЗ 1635 [5933, *Горыня, Медведева*].
V483 Tau = 57 Tau [5934] = HR 1351 = = BD+13°663 (5.7) = SAO 93872 = = HD 27397 (F0).
V484 Tau = Van Altena 575 [5935].
NR Tel = P 4700 = КЗП 4140 = 925.1935 [2771] = HV 9447 = BV 1252 [5829].
NS Tel = CoD − 53°8070 (9.4) = CPD −53°9500 (9.2) = HD 179364 (A2) = = BV 889 [5579].
NT Tel = $19^h 15^m.1$ −50°35′ (1900.0) [3636].
HI TrA = P 1025 = КЗП 2396 = 462.1933 [2926] = HV 8758 = BV 1242 [5829].
HK TrA = P 1026 = КЗП 2398 = 463.1933 [2926] = HV 8759 = BV 1274 [5834].
HL TrA = P 3964 = КЗП 2460 = 199.1934 [2588] = HV 8788 = BV 1275 [5834].
HM TrA = КЗП 7294 = S 5701 [3127].
HN TrA = P 1106 = КЗП 2734 = 488.1933 [2926] = HV 8908 = BV 1280 [5834].
HO TrA = CoD −69°1564 (10.2) = КЗП 7426 = = S 7635 [4021] = BV 1389 [5937].
BQ Tuc = HR 257 [5939] = CoD−63°21 (6.0) = = CPD − 63°83 (7.8) = SAO 248276 = = HD 5276 (Mb).
BR Tuc = P 2377 = КЗП 5641 = 147.1932 [2591] = HV 9749 = BV 1308 [5834].
ϑ Tuc = HR 139 [5938] = CoD −71°25 (6.4) = = CPD −71°20 (6.6) = SAO 255679 = = HD 3112 (A5).
CE UMa = $11^h 13^m.5$ + 29°38′ (1950.0) [5940].
CF UMa = BD + 38°2285 (B) = Cr 1830 B [5941].
FX Vel = CoD −37°4833 (9.6) = CPD − 37°2534 (9.2) = BV 1097 [5857].
FY Vel = CoD−49°3621 (7.5) = CPD −49°1689 (7.2) = SAO 220069 = = HD 72754 (Bp) [5942, 5943].
FZ Vel = HR 3588 [5944] = CoD −46°4810 (5.9) = CPD −46°3297 (6.2) = SAO 220717 = = HD 77140 (F0).

GG Vel = CoD − 42°5065 (8.0) = CPD −42°3467 (8.0) = SAO 220955 = = HD 79459 (A0) = BV 1201[5557].
GH Vel = CoD − 48°4529 (9.4) = CPD −48°2317 (9.3) = HD 79669 (Mb) [5828].
GI Vel = CoD − 44°5460 (8.1) = CPD −44°3761 (9.0) = SAO 221143 = = HD 81576 (Mb) [4457, 5945, 5828] = КЗП 6719.
GK Vel = CoD − 43°5262 (7.2) = CPD −43°3664 (7.9) = SAO 221146 = = HD 81575 (Mb) [5946, 5945, 5828] = КЗП 6720.
GL Vel = CoD − 52°3075 (7.5) = CPD −52°2368 (8.5) = SAO 236983 = = HD 81922 (Mb) [5828].
GM Vel = CoD − 46°5512 (9.7) = CPD −46°3943 (9.6) = HD 85008 (M2) [5828] = КЗП 1507 = S 4921[0085] = = № 953, SA 173 [5208].
DY Vir = S 10619 [5884].
DZ Vir = S 10667 [5884].
EE Vir = S 10668 [5884].
EF Vir = S 10670 [5884].
EG Vir = КЗП 1857 [5947] = HV 10088 [0756].
EH Vir = S 10671 [5884].
EI Vir = GR 155 [5947].
EK Vir = S 10672 [5884].
EL Vir = S 10673 [5884].
EM Vir = S 10674 [5884].
EN Vir = GR 156 [5847].
EO Vir = S 10678 [5884].
EP Vir = Zi 964 = HR 4854 [4170] = BD + 6°2660 (6.7) = SAO 119585 = = HD 111133 (B9) = КЗП 101328.
EQ Vir = BD−7°3646 (9.0) = SAO 139419 = = HD 118100 (K 2) [5899].
ER Vir = BD−13°3824 (7.0) = SAO 158357 = = HD 123214 (Mb) [5828].
ES Vir = BD−8°3705 (8.5) = SAO 139753 = = HD 123576 (Mb) [5828].
ET Vir = HR 5301 = BD −15°3817 (5.0) = = SAO 158401 = HD 123934 (Ma) [5828].
EU Vir = BD−18°3769 (8.9) = SAO 158421 = = HD 124188 (Mb) [5828].
EV Vir = BD−13°3845 (7.0) = SAO 158431 = = HD 124304 (Mb) [5828]. = = КЗП 102741 = BV 847 [5201] = = № 169, SA 130 [5208].
EW Vir = BD−15°3839 (8.5) = HD 124989 (Mb) [5828].
EX Vir = BD − 16°3835 (10) = HD 125024 (Mb) [5828].
EY Vir = BD−12°4019 (8.7) = SAO 158492 = = HD 125356 (Mc) [5828].
EZ Vir = BD−18°3799 (8.5) = SAO 158504 = = HD 125624 (Ma) [5828].
FF Vir = BD+1°2927 (7.0) = SAO 120452 = = HD 126515 (A2) = КЗП 7132 = = Babcock 49 [4170].
LY Vul = СПЗ 1644 [5898].
LZ Vul = СПЗ 1656 [5898].
MM Vul = СПЗ 1661 [5898].
MN Vul = СПЗ 1595 [5876].
MO Vul = S 8315 [4471].

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New abbreviations

Шемаха цирк	Циркуляр Шемахинской астрофизической обсерватории
As Ap Suppl	Astronomy and Astrophysics, Supplement Series
Mt Stromlo Mem	Memoirs of the Mount Stromlo Observatory
SAO	Smithsonian Astrophysical Observatory Star Catalogue
TTV	Tallin–Tartu Variable

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NOTE ON THREE NEW RED VARIABLES

It has been discovered by Wisse (1971) that the star HD 184077, then used as a comparison star for AQ Sgr, was variable.

She used HD 184201 in deriving the light and colour curves. At that time there was no evidence that HD 184201, also used as a comparison star for V450 Aql, was variable as well.

After a new check both HD 184201 and HD 184077 turned out to be variable. The amplitude of the light variation of HD 184077 is about $0\overset{m}{.}15$ in the period JD 2441100-220; the star is most probably of the type Lb.

The range of light variation of HD 184201, measured over the same period, is about $0\overset{m}{.}35$, and this star will be of type SRb.

HD 197753, reported to be variable by Wisse (1971), has been observed in 1971, and the variability has been confirmed. The type of variability is Lb. Detailed results will be published in a forthcoming paper.

Individual observations and light curves are svailable upon request.

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NEW LIGHT ELEMENTS FOR V CRATERIS

The eclipsing binary V Crt (BD-15° 3260) has been observed by us on four nights in March-April 1972 through B and V filters with a photoelectric photometer attached to the 1.2 meter reflecting telescope of the Rangapur Observatory. From observations made on the night of March 20, 1972, we have determined the time of primary minimum using the method of Kwee and van Woerden (1956). The heliocentric time of primary minimum was found to be JD hel 2441397.3323.

In the third edition of the General Catalogue of Variable Stars light elements for this system are given as

$$\text{JD hel.min. I} = 2427460.525 + 0^{d}.702034 \text{ E.}$$

These elements seem to have been adopted from the work of Tsesevich (1954). However, on going through this paper we noticed that in the normal light curve obtained by using the elements given above the primary eclipse occured at phase $0^{p}.98$, so that the time of primary minimum should be corrected to JD hel. 2427460.511.

The differences between the observed and computed times of minima using the above elements are given in Table I as $(O-C)_1$. The systematic nature of the residuals indicates an error in the period given above. Therefore, we propose the following new light elements for V Crt:

$$\text{JD hel.min. I} = 2441397.3323 + 0^{d}.7020361 \text{ E.}$$

The residuals obtained with the new light elements are given in Table I as $(O-C)_2$.

Table I

JD hel. min. I	$(O-C)_1$	$(O-C)_2$	Reference
2427460.511	-0.014	+0.000	Tsesevich (1954)
2427478.763	-0.015	-0.001	Gaposhkin (1953)
2432299.653	+0.008	+0.007	Solovyev (1958)
2441397.3323	+0.028	+0.000	

Our observations indicate that the primary eclipse is partial. The depth of the primary minimum was found to be $0^m.63$ and $0^m.60$ in B and V, respectively, and not $1^m.0$ as given in the General Catalogue of Variable Stars. Duration of the primary minimum is nearly $0^d.20$, and the variation of light outside the eclipses is approximately $0^m.1$.

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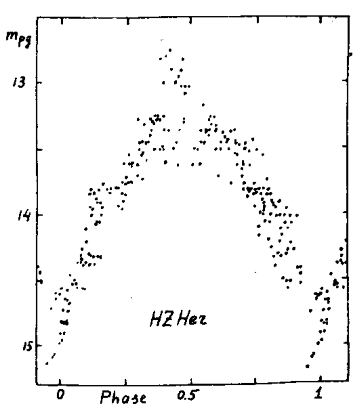
ON THE NATURE OF THE OPTICAL VARIATIONS OF HZ Her=Her X1

The variable star HZ Her was recently identified with a close binary system, containing the X-ray pulsar Her X1 (1-3). Using 249 old plates (1907-1972) we investigated the optical periodical variability (4) (see Fig.1). The moments of optical minima coincide with the epochs of X-ray eclipses derived in (5). The period $p=1^d.70017$ is stable during 65 years. The light variations are symmetrical to phase 180^o; the light intensity monotonically increases from 0^o to 180^o and decreases from 180^o to 360^o. The hemisphere of the optical component turned to the



X-ray source is three times brighter than the opposite one. Therefore we suggest that the reflection effect is the main cause of the light variations. The X-ray radiation, falling on the surface of the visible component is absorbed in the photosphere and reradiated in the optical and ultraviolet spectral bands. The importance of X-ray heating of the normal component in X-binary system was pointed out in (6,7). The spectral class lies in the range B2-A7 V (8-10), the earlier spectrum is at the brightness maximum. In this picture the latest observed spectrum reflects the properties of the visual star. Its mass must be of the order of $2M_\odot$, its distance is about 1.5 kpc and its z -coordinate is about 750 pc. At this distance the X-ray luminosity of the system will be about 3.10^{35}-10^{36} erg/sec and exceeds the optical luminosity of the A7V star ($\sim 10^{34}$ erg/sec). This is in rather good accordance with the estimation of X-ray energy needed for increasing the brightness of the optical component due to reflection effect. The dispersion of points near the maximum of the light curve is real and probably correlates with the cycle of the X-ray radiation, which is observed only 9 days during every 36 day cycle (5).If there is a real correlation, the maximal optical luminosity corresponds to the phase 0.5 of the 36 day cycle, when the X-ray flux in the direction to the Earth is absent.

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PHOTOELECTRIC OBSERVATIONS OF V 1216 Sgr DURING THE 1972, JULY 3-17 INTERNATIONAL PATROL

According to the observing schedule of cooperative observations proposed by the IAU Working Group on Flare Stars (P.F. Chugainov, 1971, IBVS No.605), V 1216 Sgr was patrolled at the Catania Astrophysical Observatory for about 20.3 hours.

The observations were carried out with a 61 cm universal type reflector feeding a synchronous u,b,v photometer.

The detailed coverage intervals are given in the accompanying Table 1. One flare was observed during our patrol and its characteristics are reported in Table 2 (see Figure).

The explanation of symbols and details of the observing equipement can be found in a preceeding number of this Bulletin (Cristaldi and Rodonò, 1971, IBVS No.525).

Catania Astrophysical Observatory
September 16, 1972

S. CRISTALDI
M. RODONÒ

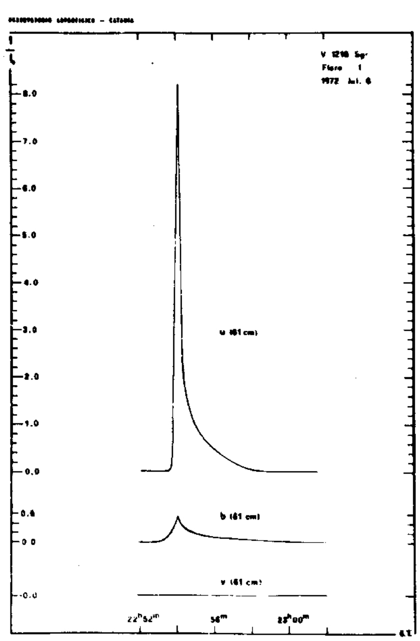

Table 1.

(61 cm telescope)

Date	Light	Coverage (UT)	Total coverage	$\overline{3\sigma/I_o}$
1972 July				
03-04	u/b/v	20^h42^m-2101; 2103-2130; 2137-2153; 2211-2221; 2247-2254; 2256-2318; 2320-2342; 2344-2400; 0006-0027; 0030-0052; 0108-0120; 0132-0141.	203^m	.50/.11/.06
04-05	u/b/v	2216-2236; 2239-2248; 2317-2336; 2347-2357; 0011-0021; 0036-0045; 0047-0107; 0116-0134; 0137-0149; 0154-0200.	133	.40/.07/.03
05	u/b/v	2022-2039; 2040-2050.	27	.70/.13/.07
06-07	u/b/v	2205-2219; 2222-2229; 2231-2244; 2247-2259; 2301-2311; 2352-2400; 0000-0004; 0009-0013; 0014-0035; 0037-0057; 0103-0122; 0131-0142; 0144-0200.	159	.76/.10/.04
07-08	b/v	2339-2356; 0026-0043; 0045-0106; 0108-0126; 0129-0147.	91	.10/.06
10-11	u/b/v	2031-2051; 2053-2057; 2059-2114; 2123-2158; 2214-2227; 2317-2327; 2338-2357; 2359-2400; 0000-0026.	143	.70/.09/.05
11	u/b/v	2237-2258; 2300-2307.	28	.46/.06/.03
15-16	u/b/v	2127-2146; 2152-2241; 2311-2329; 2336-2400; 0000-0013; 0018-0024.	139	.60/.08/.05
16	u/b/v	2050-2109; 2111-2133; 2134-2146; 2149-2211; 2213-2227.	89	.57/.07/.03
17-18	u/b/v	2046-2100; 2104-2149; 2151-2211; 2237-2400; 0000-0044.	206	.53/.08/.05

Table 2.

(July 6, 1972)

no.	Light	t_{max} UT	JD 2441000.0000	d_b	d_a	$3\sigma/Ior$	$(I_f/I_o)_{max}$	P	Energy erg	Air mass	f	sky
1	u′	$22^h54^m.1$	505.4542	0.4	4.4	2.00	8.20	4.77	$2.67x10^{30}$	1.70	0	2
	b	22 54 .1	505.4542	0.5	6.2	0.10	0.55	0.83	$2.95x10^{30}$	1.70	0	2
	v	-	-		-	-	-	-	-	-	-	-

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 722

Konkoly Observatory
Budapest
1972 October 9

PHOTOELECTRIC OBSERVATIONS OF V 1057 AND V 1329 Cyg

Photoelectric observations of the variables V 1057 and V 1329 Cyg have been obtained with the 60 cm (f/5) telescope of Hamburg Observatory. The measured magnitude differences were transformed to the UBV-system. Photometric standards of the open cluster NGC 6910 were chosen. The observations are given in the Table.

Star	JD_{hel}	V	B-V	U-B
V 1057 Cyg	244 1187.4569	9.480	+1.217	+0.666
Comparison				
BD +43°3781	-	9.944	+1.337	+1.398
V 1329 Cyg=HBV475	0836.4137	12.797	+0.361	-0.726
	0863.3513	12.922	+0.231	-0.639
	1187.4110	13.066	+0.362	-0.609
	1239.3763	13.128	+0.556	-0.619
Comparison				
BD +35°4290	-	10.336	+1.121	+0.834

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COMMISSION 27 OF THE I. A. U.

INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 723

Konkoly Observatory
Budapest
1972 October 11

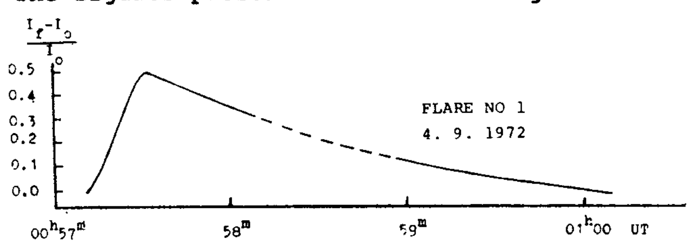
CONTINUOUS PHOTOELECTRIC MONITORING OF EV Lac DURING THE INTERNATIONAL PATROL, SEPTEMBER 1-15, 1972

The flare star EV Lac has been monitored with the 30 cm Cassegrain reflector at the Oslo Solar Observatory of the Institute of Theoretical Astrophysics,University of Oslo. ($\lambda=-0^h43^m02^s$, $\phi=+60^o12'30''$, h=585 m).The observations were carried out in the international B-band with a 1P21 photomultiplier from RCA.The telescope and photometer system are described by Sivertsen (Ref.1).

During the 21.7 hours of monitoring 2 flares were observed. Detailed coverage is given in Table 1.Physical characteristics of the observed flares are given in Table 2, the quantities being presented according to proposals of Andrews et. al. (Ref.2.).

Due to the rapidly changing observing conditions we have found it necessary to prescibe a letter to each monitoring interval describing the standard fluctuations. (a),(b), and(c) refers to observing periods with $\frac{\sigma}{I_o}\leq 0.15$, $0.15<\frac{\sigma}{I_o}\leq 0.20$, $0.20<\frac{\sigma}{I_o}\leq 0.25$, respectively. Observations with $\frac{\sigma}{I_o}>0.25$ are rejected.

The figures present the smoothed light curves.



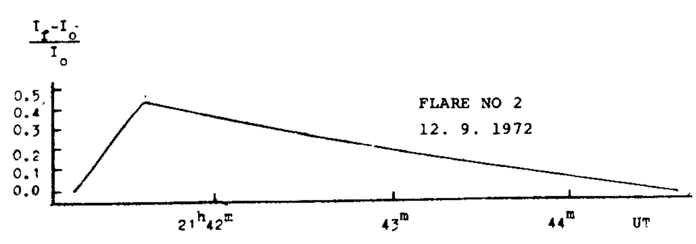


TABLE 1

MONITORING INTERVALS

Date 1972 Sept.	Monitoring intervals UT	Total Monitoring Time
3-4	22^h07^m-22^h28^m(b), 2232-2250 b, 2255-2308(b), 2328-2345(b), 2352-0010(a), 0015-0053(b), 0056-0215(a), 0217-0225(c), 0230-0245(c).	3^h47^m
4	2028-2034(b), 2120-2139(c), 2147-2151(a), 2200-2246(a), 2254-2303(a), 2321-2327(a), 2332-2336(b).	1 34
6	0000-0005(b), 0012-0025(a), 0029-0050(c), 0057-0115(a), 0121-0135(b), 0140-0224(b), 0229-0234(c).	2 00
7	0031-0036(c), 0038-0055(b), 0109-0112(b), 0114-0117(b), 0120-0138(b).	0 46
8-9	2000-2012(b), 2014-2050(b), 2100-2109(a), 2116-2141(a), 2147-2156(a), 2158-2210(a), 2215-2241(a), 2244-2254(a), 2256-0045(a), 0108-0130(a), 0134-0213(a), 0215-0227(a), 0235-0246(b).	5 32
11	1948-2023(a), 2031-2057(a), 2104-2121(b).	1 18
12-13	1952-2011(c), 2014-2027(b), 2032-2210(b), 2236-0033(b), 0033-0117(c), 0120-0132(c), 0149-0232(c).	5 46
14	2211-2223(c), 2230-2319(c).	1 01
	Total	21^h44^m

TABLE 2

OBSERVED FLARES

Flare No	Date 1972 Sept	Max UT	$\frac{I_f-I_o}{I_o}$	Δm_B mag	t_b min	t_a min	P_B min	σ_B mag	Air mass
1	4	$00^h57^m.5$	0.50	0.44	0.33	2.66	0.57	0.09	1.19
2	12	21 41.5	0.41	0.35	0.37	3.00	0.60	0.14	1.04

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Norway.

Oslo, Oct. 4, 1972

B. N. ANDERSEN

B. R. PETTERSEN

References:

1. Sivertsen, S.: Institute of Theoretical Astrophysics, Blindern, Oslo.Report No. 34, 1972.

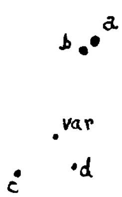
2. Andrews, A.D., Chugainov, P.F., Gershberg, R.E., and Oskanian, V,S.:Comm.27 IAU,I.B.V.S.No. 326.1969.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 724

Konkoly Observatory
Budapest
1972 October 12

VARIABILITY OF BD $-10^{\circ}4662$ CONFIRMED

At the request of Dr.George H.Herbig BD $-10^{\circ}4662$(cf. IBVS 545, 559, and 570) has been examined on plates at the Maria Mitchell Observatory. Some 210 plates taken since 1920 show the variable, most of them near the plate edges where the definition is not good. The chart shows the variable and the adopted comparison stars, whose photographic magnitudes are only crudely estimated from S.A. 134 some 5° away. The variable is usually between b and c in brightness, 11.3 to 11.5 mag. On three nights it was distinctly brighter than b, at an estimated 10.9 mag. Although the magnitudes as such are not very reliable, the variability of BD $-10^{\circ}4662$ is obvious - a probable flare type star.



Comparison Stars

		mag
a	BD $-10^{\circ}4655$	10.8
b	4657	11.1
c	-	11.6
d	BD $-10^{\circ}4658$	11.8

			mag
6 September	1927, J.D.	25130.531	10.9
27 August	1930	26216.562	11.2
		.608	10.9
		.652	11.0
30 September	1953	34651.526	10.9

8 June 1972

DORRIT HOFFLEIT
Maria Mitchell
Observatory

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 725

Konkoly Observatory
Budapest
1972 October 13

NOVA IN LARGE MAGELLANIC CLOUD

J.A. Graham, Cerro Tololo Interamerican Observatory, cabled on September 7 that he had found a probable Nova in LMC and advised it needed confirmation. Its magnitude was 13 on August 22 plates. The 1975 position is: $05^h28.6^m$, $-68^o50'$. This is approximately one minute southeast of HV 12053.

B. Ward, Tirau, had photographed this region on July 30 and August 6, 1972. On both occasions the exposures were five minutes of Trix-X film centred on CPD -68^o 375.

The approximate magnitudes obtained from the prints supplied by Ward are:

1972 July	30.312	U.T.	12.0
Aug.	6.319	U.T.	11.0

A further photograph on Sept. 12.419 U.T., with a limit of 13.0, failed to show the nova.

Information on the nova was immediately circulated in New Zealand on receipt of Graham's cable with the result that it has been observed at the Carter Observatory (see IAU Circ. 2445).

October 4, 1972

F.M. BATESON
V.S.S., R.A.S.N.Z.,
Tauranga, NEW ZEALAND.

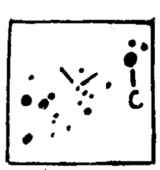
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 726

Konkoly Observatory
Budapest
1972 October 16

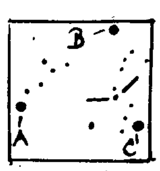
NEW RESULTS ON KNOWN VARIABLES IN SAGITTARIUS

In a recent publication on variable stars in Sagittarius Plaut (1971) noted several long period variables for which a definitive choice between two alternative periods was not possible on the basis of his available plate material. A few of these stars are in an area overlapping the field of the Maria Mitchell Observatory plates. I therefore suggested to Carol Day that she examine these stars and combine her own observations with the published data, thereby seeking more definitive solutions. Also included in our summer 1972 program were other previously published variables for which different authors had obtained discordant results, or stars for which errors in the General Catalogue of Variable Stars had come to my attention, and a few stars still listed only in the Catalogue of Suspected Variables.

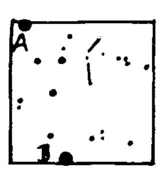
A summary of the results is given in the Table, where previously published periods, or types (if now revised) are noted together with the new or revised periods. The initials in the last column indicate the recent investigator (CD, Carol Day; BH, Barbara Hatfield; PK, Pamela Knight; and DH, Dorrit Hoffleit) while the number refers to a footnote.



MW

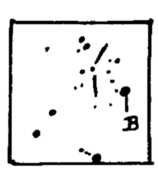


V929

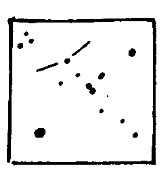


S4903

V1703



V1709


GS

For six of the variables for which no finder charts have previously been published, such charts are given here. The stars marked A, B or C are identified as follows:

MW Sgr	C	CoD $-27^{\circ}13160$	V1709	B	BD $-19^{\circ}5136$
V 929	A	CoD $-31^{\circ}15485$	S 4309	A	CoD$-30^{\circ}16079$
	B	15488		B	16088/9
	C	15494	GS Sgr		Chart area 5'x5'
V1703	B	BD $-18^{\circ}5031$			

Miss Carol Day and Miss Pamela Knight were summer NSF Undergraduate Research Participants, while Miss Barbara Hatfield was employed under NSF Grant GP-30065. We are grateful to the National Science Foundation for this support and encouragement.

8 October 1972

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References

Innes, R., 1917, Union Observatory Cir. No. 37

Plaut, L., 1971, Astron. and Astrophys. Supp. Series, 4,No.2.

TABLE

Revised Results for Variables in Sagittarius

Var. Sgr	Previously Published Periods	Revised Elements	Span of Epochs	Note
MW	260,207,208.3,208,5	36085+204n+ +15sin4°.5 (n+42)	110	CD
V929	196,8, 400	35687+194.5n	122	CD
V932	225,227.5,149	28422+225n	98	CD
V938	220.7,219.5,137	19575+138n	129	CD,1
V1293	153,154.8,272	27711+155n	88	CD
V1703	207,312	26120+206n	75	CD,2
V1709	212, UG	26160+210.8n	73	CD,3
V1835	173,262	27635+262n	80	CD
V1836	242,244,301.5,	27635+244n	57	CD
V1919	162,162.8,189.4	27635+162n	58	CD
V2032	UG? 1250?	36720+229.5n	75	DH,4
V2368	194	26570+193.8n	90	DH,5
V2378	312	36750+312n	44	CD
V2383	UG	25850+188.5n	94	DH,6
V2565	300:	27630+305:n	45	PK,7
DH117b	320	26120+320:n	17	PK,7
S4025	28.14	37826+28.14n		BH,8
S4309	-	37100+422n	53	PK
GS	-	SR$\sim$360days?		PK,9

Notes to Table

1. V 938 Sgr. A period of 220 days is still not precluded. 138 days is preferred because it appears to represent the early observations by Innes slightly better. No Nantucket observations available for this star.

2. V 1703 Sgr. The period of 207 days given for this star in A.J.,62, 121 1957 (HV12398) is esentially correct. The period of 312 days given in the General Catalogue refers to V 2378 Sgr. The confusion is attributed to the crude positions given by Hartsock in her provisional paper in AAVSO Abstracts, Fall 1964.

3. V1709 Sgr. The type UG listed in the General Catalogue refers to V2383. Same comment as for V1703 Sgr.

4. V2032 Sgr. The previously published type and period depended upon only four observed maxima with a minimum separation of 2500 days. Nantucket plates for 1957-72 reveal the revised period which also satisfies the earlier Harvard observations. Mira Type.

5. V2368 Sgr. New measures have been added because the period given in A.J., 70, 307, 1965 (star 17) has been omitted from the General Catalogue.
6. V2383 Sgr. Because of crude positions this star was belived to be V1709 Sgr (q.v.).
7. V2565 Sgr and DH 117b (See IBVS 617 and 660). These two stars were re-examined to avert any possible confusion between two stars close together both in position and period.
8. S4025. HV 9396. The period for this W Virginis type star, given in A.J., 69, 301, 1964 (Star 3) has been confirmed by further observations for the interval JD 38169-41219.
9. GS Sgr. Probably semi-regular. No satisfactory period found. Cycles of about a year, more frequently at maximum than minimum. Miss Knight finds that a period of 180 days seems to represent a high percentage of the observations. However, the duration of maximum or of minimum is sometimes 150 days. Doubling her period gives no improvement as the period is too close to one year.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 727

Konkoly Observatory
Budapest
1972 October 17

PHOTOELECTRIC UBV OBSERVATIONS OF CEPHEID VARIABLE BE MONOCEROTIS

The variable star BE Mon (BD+7°1394) was discovered by Hoffmeister (1). Soloview (2) observed that star visually by means of Nijland-Blashko method during the period Feb. 1935 - April 1936 with a 125 mm Zeiss refractor. Assuming RR Lyrae variability, he computed elements by the least squares method as:

Max.Hel. J.D.=2427863^{d}.244 + 0^{d}.4210568 E

His observations were published later (3). The next series of observations were made by Ahnert (4), reduced and discussed with the assumption of RR Lyrae type variability. However, in the next paper Ahnert (5) rediscussed his and the Soloview observations and classified the star as cepheid variable with elements:

Max.Hel.J.D.=2427892^{d}.78+2^{d}.705503 E

The Cepheid type for BE Mon confirmed by spectral observations of Götz and Wenzel (6) who observed a spectral range F3 - F9 for that star. Wisniewski observed the star photoelectrically during 1963-1965 on the UBV system. The data are given in Table 1 and plotted in Fig.1, where phases were computed with formula: cycles + Phases =(J.D.-2438000)/P. The precision of photoelectric observations and 30 years time span between visual and photoelectric observations permit us to improve the period. From the Soloview observations we computed normal points with 0.03 phase interval. The new elements are:

Max.Hel.J.D.=2438741^{d}.75+2^{d}.705512 E

Comparing the observed colours at min. with intrinsic colours of supergiant F9 from Johnson (7), we find the following excesses:

	U-V	B-V
BE Mon	2^{m}15	1^{m}26
F9 I	1.12	0.62
Excess	1.03	0.64

which for R= $A_V/E(B-V)=3.2$ gives us $2^m.05$ of absorption in visual region. Such absorption has an additional support from B. Lynds (8) Catalogue of Dark Nebulae, where near Equator for $l=200^\circ-210^\circ$ dark nebulae are a common feature.

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References

(1) Hoffmeister C.,A.N.,253,195, 1934
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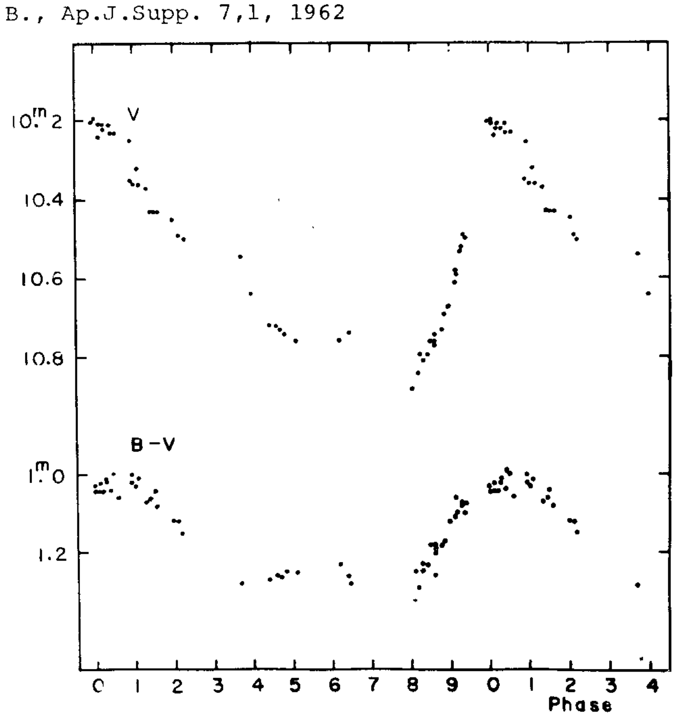


TABLE I

Observations of BE Mon

2438000+	V	B-V	U-B	2438000+	V	B-V	U-B
370.859	$10^{m}.58$	$1^{m}.10$	$0^{m}.80$	773.750	$10^{m}.81$	$1^{m}.23$	$0^{m}.78$
370.888	10.53	1.08	0.79	773.844	10.76	1.26	0.82
370.900	10.52	1.07	0.78	784.630	10.76	1.18	0.87
370.916	10.50	1.07	0.77	784.663	10.74	1.19	
475.641	10.74	1.26		784.709	10.69	1.17	0.86
475.650	10.74	1.28		784.749	10.67	1.12	0.78
703.905	10.24	1.02		784.795	10.58	1.11	0.90
703.919	10.24	1.04		784.855	10.49	1.10	0.94
725.926	10.43	1.04		792.622	10.88	1.25	0.84
725.935	10.43	1.08		792.649	10.84	1.29	0.90
729.883	10.76	1.23		792.726	10.79	1.23	0.70
741.739	10.20	1.03	0.75	792.758	10.76	1.18	0.92
741.753	10.19	1.04	0.68	809.625	10.35	1.00	0.75
741.765	10.21	1.04	0.73	809.661	10.36	1.03	0.70
741.787	10.21	1.04	0.64	809.740	10.37	1.07	0.74
741.798	10.22	1.04	0.64	810.584	10.72	1.27	
741.812	10.22	1.02	0.68	810.632	10.72	1.26	0.92
741.823	10.22	1.01	0.69	810.658	10.73	1.26	0.91
741.845	10.21	1.04	0.64	810.693	10.74	1.25	
741.860	10.23	0.99	0.67	810.762	10.76	1.25	
741.874	10.23	1.00	0.68	811.626	10.79	1.25	0.90
741.905	10.23	1.06	0.63	811.720	10.77	1.20	
742.756	10.54	1.28		811.756	10.73	1.18	
742.815	10.64			811.853	10.61	1.06	
744.746	10.32	1.01		812.618	10.45	1.12	0.76
744.835	10.43	1.06		812.665	10.49	1.12	
771.759	10.25	1.02		812.680	10.50	1.15	
771.809	10.36	1.01					

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 728

Konkoly Observatory
Budapest
1972 October 19

ANNOUNCEMENT

The dates for the simultaneous searches for rapid (time scales < 24^h) variations in the optical, IR and radio emission from 3C 120, OJ 287, and BL Lac [see Information Bulletin No. 687 and Astrophys.J. (Letters) 178, L61, 1972 (Dec. 1)] have been set for 1972 Dec. 2/3-8/9 [BL Lac (first half of night) and 3C 120 (second half of night)] and 1973 Feb. 1/2 - 7/8 (OJ 287). At least 33 groups plan to participate. Interested observers should write to Eugene E. Epstein, The Aerospace Corporation, Box 92957, Los Angeles, Calif. 90009.

EUGENE E. EPSTEIN
Radio Astronomy Program
120/2101

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 729

Konkoly Observatory
Budapest
1972 October 23

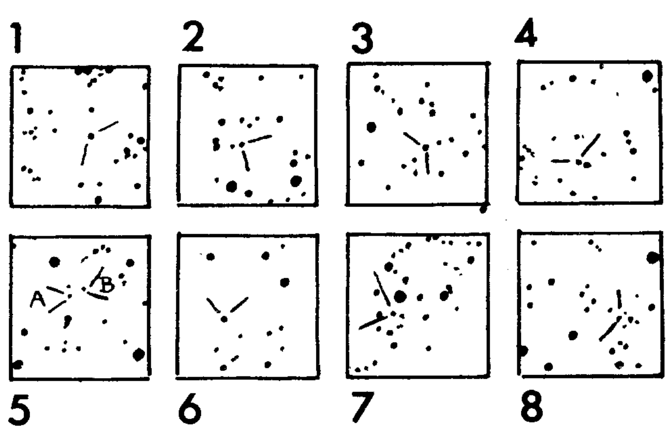
EIGHT NEW LONG PERIOD VARIABLES IN SAGITTARIUS

Among the variables discovered with the Rodman Blink Microscope in the summer of 1971 by students at the Maria Mitchell Observatory are eight new long period variables, three with apparently changing periods.

No.	Position 1900		Max	Min	Type	J.D.	Period	D*	C*	Note
1	$18^h20^m19^s$	$-32^\circ20'.7$	12.2	13.6	SR	41180	200	EH	PK	
2	20 46	-28 35.8	12.5	[14.	M	36780	239	EH	PK	
3	22 52	-28 27.8	12.6	[14.5	SR	36035	115.3	KK	PK	1
						39370	114.5			
4	22 55	-22 50.9	13.3	[15.	M	37140	249	EH	BH	
5	24 35	-20 7.0	12.3	14.9:	M	31970	358	PB	BH	2
						41140	367			
6	27 17	-20 10.4	11.6	[14.2	M	30090	345	PB	BH	3
						36830	358			
7	35 49	-27 55.9	13.0	[14.5	M	37490	270	EH	DH	
8	36 40	-28 12.0	12.5	[14.5	M	40120	345	EH	DH	

*D, Discoverer: PB, Pamela Bonnell; EH, Esther Hu; KK, Karen Kwitter.

C, Computer: BH, Barbara Hatfield; DH, Dorrit Hoffleit; PK, Pamela Knight.



Notes:

1. The period of 115.3 days holds for JD 26000-38000; from 38000 to 41500 the period is 114.5 days.

2. For JD 23900-33000 the period of 358 days holds, while 367 days fits the observations for 31500-41500. In the overlap interval either of these periods satisfies the available observations. In chart 5 the variable is marked A; star B is a suspected short period variable.

3. For JD 23900-32000 the period of 345 days fits the observations, whereas 358 days (fortuitously the same as for the early observations of the preceding star) fits the observations for 36000--41500.

Of the students listed as discoverers (D) or computers (C), Miss Pamela Knight was a 1972 NSF Undergraduate Research Participant; the others were all employed under the 1971 NSF Grant GP-30065. We all wish to express our appreciation to the U.S. National Science Foundation.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 730

Konkoly Observatory
Budapest
1972 October 30

FLARE ACTIVITY OF Gl 669 A

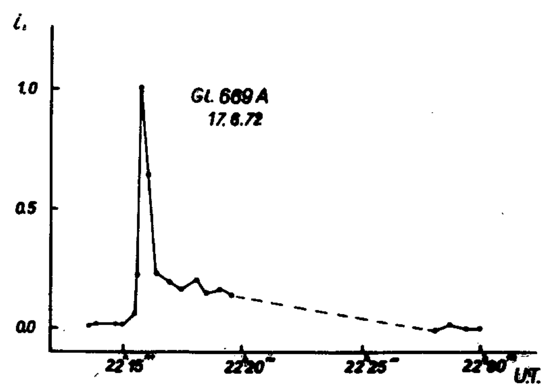
The double system Gl 669 AB (= Ross 867 + Ross 868) consists of the 11.3 m_v dM4e and 12.8 m_v dM5.5e stars separated by about 16". Both stars exhibit the Ca II H and K lines and the Balmer series in emission. The flare activity of Gl 669 B (Ross 867) was observed photoelectrically in U-band by Kunkel [1]. Gl 669 A was observed photoelectrically in V-band for a total of 35.6 hours by Roques [2] but during that time no flares were registered.

Our photoelectric observations of Gl 669 A were carried out on the 64 cm meniscus telescope at the Crimean Observatory in photometric system close to B. The star was observed for a total of 12.5 hours during the period from 3 June to 5 July 1972, and one flare was registered. The flare characteristics according to [3] are the follows:

Date	UT_{max}	$I_{o+f}-I_o/I_o$	σ/I_o	P_B (min)
17.6.1972	$22^h15^m.8$	1.00	0.05	1.60

The light curve of the flare in Fig.1 has relative intensity $i_B=I_{o+f}-I_o/I_o$ as ordinate and Universal Time as abscissa.

The discovery of the flare activity of Gl 669 A confirms the conclusion [4,5] that the previous hypothesis, according to which only the fainter component of a binary UV Ceti type is always the flare star, is not valid.



During 1970 - 71 four spectrograms with dispersion 155 Å/mm in the spectral range 5700-7000 ÅÅ have been obtained with the 2.6 m reflector at Crimean Observatory. The equivalent widths of the H-alpha emission line - $W_{H\alpha}$(Å)-range on these spectrograms from 1.4 to 2.1 Å (the probable error of $W_{H\alpha}$ obtained from one spectrogram is equal to 25%). This value is 6-7 times less than $W_{H\alpha}$ in the quiet spectra of the most active flare stars EV Lac, AD Leo, YZ CMi, UV Cet [6]. According to the correlation between the emission intensity in quiet state spectra and the flare activity level of the flare stars [6], the activity level of the Gl 669A is approximately 100 times less compared to the very active flare stars.

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PHOTOELECTRIC OBSERVATIONS OF THE ECLIPSING VARIABLE
U CORONAE BOREALIS

Photoelectric observations of U Coronae Boreales in UBV system were made with the 24-inch reflector at the observing Station of the Laboratory of Astronomy of the University of Ioannina (longitude=-1^h23^m, latitude=$+39^\circ37'$) on eighteen nights between May and July 1972. The photometer was furnished with a 1P21 photomultiplier tube and yellow, blue and ultraviolet corning filters 3385, 5562 and 9863.

The comparison star used was BD + $32^\circ2578$, the same one as previously used by Wood (1958).

The observations of UCrB in V are plotted in Figure 1, while the normal points of observations of UCrB in V,B and U are given in Table 1. The first column of Table 1 gives the phase in units of the period, while the second, third and fourth columns give the differences of the magnitude of UCrB minus that of the comparison star in V, B and U, correspondingly. The phases were determined by using the ephemeris of Dugan and Wright (1939):

Primary Minimum = J.D. 2416747,964 + 3.45220416 E.

Using the observations through and near primary minimums we got the observed times of primary minimum included in Table 2. The second column of Table 2 gives the O-C of times of minima when the computed times of minima were determined by the Ephemeris of Dugan and Wright, while in the last column of Table 2 the O-C are determined by using the period given by S. Catalano, S. Cristaldi and C. Lacona (1966):

$$P = 3^d.4522027$$

Since Wood (1958) found O-C=+0.008 day using Dugan and Wright's formula given above the present data of Table 2 show that the period of UCrB continues to become smaller.

Table 1

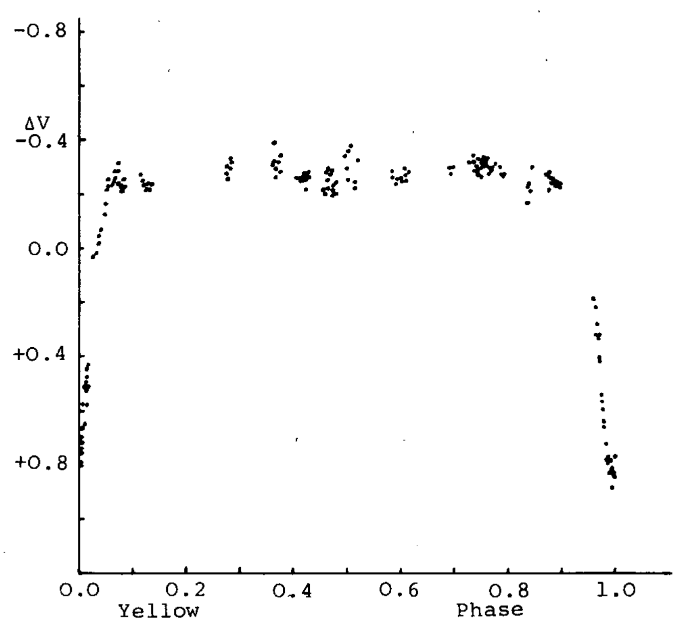
Normal Points

Phase	ΔV	ΔB	ΔU	Number of Observation
0,0020	+ 0,743	+ 0,557	+ 0,123	3
0,0085	+ 0,673	+ 0,339	+ 0,006	4
0,0110	+ 0,650	+ 0,475	- 0,156	3
0,0153	+ 0,506	+ 0,345	- 0,242	4
0,0173	+ 0,478	+ 0,297	- 0,182	3
0,0347	+ 0,016	- 0,170	- 0,828	3
0,0431	- 0,079	- 0,436	- 0,998	3
0,0529	- 0,214	- 0,501	- 1,110	4
0,0682	- 0,267	- 0,573	- 1,184	6
0,0807	- 0,231	- 0,563	- 1,060	6
0,1262	- 0,194	- 0,565	- 1,027	7
0,2812	- 0,291	- 0,582	- 1,117	6
0,3648	-	- 0,608	- 1,110	-
0,3729	- 0,291	- 0,569	- 1,120	5
0,4113	- 0,249	- 0,565	- 1,029	5
0,4188	- 0,248	- 0,558	- 1,029	5
0,4262	- 0,256	- 0,563	- 1,060	6
0,4598	- 0,227	- 0,568	- 1,085	3
0,4652	- 0,249	- 0,553	- 1,024	3
0,4714	- 0,249	- 0,570	- 1,022	3
0,4777	- 0,217	- 0,544	- 1,084	4
0,5012	- 0,303	- 0,597	- 1,032	4
0,5147	- 0,287	- 0,561	- 1,080	4
0,5901	- 0,260	- 0,559	- 1,050	5
0,5987	- 0,254	- 0,586	- 1,175	5
0,6082	- 0,263	- 0,600	- 1,078	5
0,6957	- 0,285	- 0,641	- 1,097	3
0,7356	- 0,307	- 0,590	- 1,054	5
0,7472	- 0,302	- 0,635	- 1,035	4
0,7497	- 0,286	- 0,673	- 1,089	5
0,7575	- 0,306	- 0,634	- 1,059	4
0,7686	- 0,278	- 0,567	- 1,104	5
0,7894	- 0,270	- 0,584	- 1,143	4
0,8403	- 0,233	- 0,522	- 1,027	6
0,8766	- 0,248	- 0,565	- 1,033	5
0,8867	- 0,229	- 0,541	- 1,058	4
0,8942	- 0,222	- 0,556	- 1,040	4
0,9611	+ 0,236	- 0,040	- 0,508	3
0,9666	+ 0,358	+ 0,110	- 0,312	3
0,9724	+ 0,514	+ 0,262	- 0,574	3
0,9772	+ 0,636	+ 0,413	+ 0,002	3
0,9834	+ 0,765	+ 0,574	+ 0,151	3
0,9876	-	+ 0,631	+ 0,089	-
0,9910	+ 0,851	+ 0,672	+ 0,243	4
0,9920	+ 0,829	+ 0,672	+ 0,095	3
0,9974	+ 0,828	+ 0,655	+ 0,175	4

Table 2

Observed Times of Pr. Minimum	O-C	Weight	O-C
2441462.274 ± 0,002	- $0\overset{d}{,}020$	2	- $0\overset{d}{,}009$
486.436 ± 0,001	- 0,023	3	- 0,013
493.341 ± 0,001	- 0,022	4	- 0,012

Fig 1



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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 732

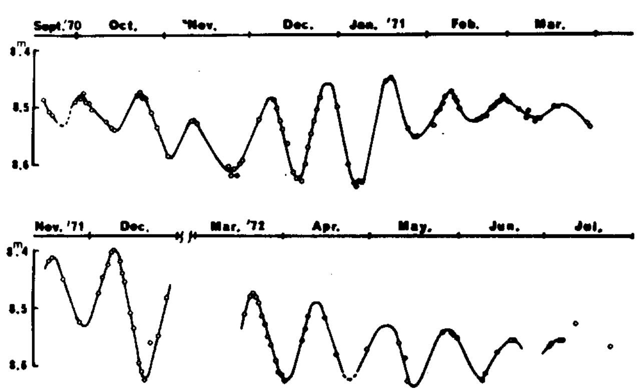
Konkoly Observatory
Budapest
1972 October 30

THE PHOTOMETRIC ACTIVITY OF RU Cam
DURING THE YEARS 1970-72

We give here the preliminary results of the systematic monitoring of the variable RU Cam performed at the Merate Observatory during the intervals September 1970-March 1971 and November '71 - July '72.

The Figure displays the increase of the amplitude of the V light curve with a first maximum in January '71, followed by a strong decrease and a second maximum in December '71 after which the decrease of the light fluctuation appears slower.

The variability looks like that of the previous years with a total amplitude of $0\overset{m}{.}2$ at the most. (Astron. and Astrophys. 18, 201, 1972). The period of the light variation seems constant along the interval 1971-72.



Merate Observatory
October 20, 1972

P. BROGLIA and G. GUERRERO

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 733

Konkoly Observatory
Budapest
1972 October 30

OPTICAL VARIABILITY OF Her X-1
(HZ Her)

The star HZ Her which had been identified with the X-ray source Her X-1 in IAU Circ. 2415 was estimated on 197 Sonneberg plates of 1934 to 1940 and 1959 to 1972. The optical variability as it is shown by our plates (exposure times generally between 0.5 hour and 3 hours) is rather curious:

1.) The "occultation" period given first by Tananbaum et al. (ApJ 174, L 143) for the X-ray intensity cycle can be verified with evidence for the following intervals:

JD 242 7666 to 242 8345 and
JD 243 6607 to 244 1443 (last plate).

The mean light curve assembled by the elements

$t_{Min.} = 244\ 1397.584 + 1^{d}.70017.E$

is slightly unsymmetric, thus resembling a δ Cephei curve. Amplitude $\approx$ 1.5 mag. (pg); "occultation centre" of Tananbaum et al. at phase 0.00.

2.) In the intervals

JD 242 7544 to 242 7657 (begin of our series)
and JD 242 8627 to 242 9789

the star was faint and varied by 0.5 mag. at best. The 1.7-day period is working also in these intervals and a second minimum near phase 0.5 is present in the mean light curve. Note that the short transition time between 1.) and 2.) centred at JD 242 7661 is an upper limit.

3.) The 35.7-day cycle of Tananbaum et al. cannot be found in our material. Especially, between 1972 March 13 and March 20 when the 1.7-day cycle of the X-ray source had to be "silent" according to the authors quoted, the 1.7-day period is verified by 22 good plates, with full amplitude.

Items 1.) and 2.) can simply be explained by physical variability of the X-emitting component of the pair: during the intervals 2.) the surface brightnesses of the two components were of comparable value whereas in case 1.) the X-star is enhanced. One wonders whether X-rays perhaps are sent out in state 1.) only. - Item 3.) supports the fourth possibility suggested by Tananbaum et al. (l.c., L 149), that is the precession of the X-pulsar beam with the period of 35.7 days. Clearly, this mechanism does neither strongly effect the revolution of the two components nor the other optical properties whereas each of Tananbaum's three further possibilities should have consequences with regard to the optical light curve. Note that the decrease of the amplitude of the 1.7-day cycle in state 2.) obviously has nothing to do with the 35.7-day cycle.

For further details see next number of MVS.

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Sternwarte Sonneberg

W. WENZEL and H. GESSNER

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 734

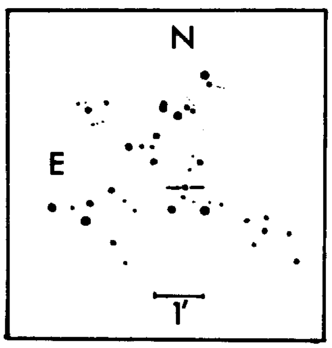
Konkoly Observatory
Budapest
1972 October 31

TWO NEW PROBABLE SYMBIOTIC STARS WITH VARIABLE SPECTRA

Sanduleak and Stephenson (1972) have recently reported five stellarlike peculiar emission-line objects having very strong [OIII] $\lambda 4363$ emission. A comparison of their blue objective-prism spectrum of one of these, Henize 38 (Henize 1967), with a description by Webster (1966) based on narrow-band photoelectric photometry led them to conclude that the spectrum may be variable and that the object may be a symbiotic star with exceptionally strong $\lambda 4363$ emission. Webster had classified this object as a probable planetary nebula, and it is listed as $280-2^{\circ}1$ in the Catalogue of Galactic Planetary Nebulae (Perek and Kohutek 1967). We have available two IIa-O objective-prism plates of Henize 38 taken nearly four years apart with the University of Michigan's Curtis Schmidt-type telescope at the Cerro Tololo Inter-American Observatory, and they confirm the variable nature of the spectrum mentioned by Sanduleak and Stephenson. The first of these was taken in May 1967, and four emission lines are present: $H\beta$, $\lambda 4686$, $\lambda 4363$ and $H\gamma$. If the density of $\lambda 4363$ is taken as 1.0, then $H\gamma = \lambda 4686 \approx 1.2$, and $H\beta \approx 2.5$; the excitation class on the Aller system (1956) is 7. The second blue plate was taken in February 1971, and the emission lines present are: $\lambda 5007$, $H\beta$, $\lambda 4363$, and $H\gamma$. Taking the density of $H\gamma$ as 1.0, then $H\beta \approx \lambda 5007 \approx 2.0$, and $\lambda 4363 \approx 3.0$; the Aller excitation class is 2 or 3. On neither plate is there evidence of a continuum.

We also have available a red (098-02 + RG 1; taken April 1972) and two low-dispersion near-infrared (I-N + W 89B; taken March 1970 and April 1972) plates of Henize 38. On the red plate there may be a faint continuum present and there are four faint emission lines in addition to the strong emission at $H\alpha$; Henize (1967) made no mention of emission lines other than Hα, and Sanduleak and Stephenson mention the presence of λ6300 of [OI] which is one of those we see. The other line that can be identified with certainty is λ6678 of He I. Measures of the remaining two emission lines on the plate (420 A/mm at Hα) place them near λ6080 and λ6850. The dispersion curve for this spectral region was determined from measures and a line list of Eta Carinae (Gaviola 1953). A suggested identification for the shortward line is a blend of [Fe VII] and [Ca V] at λ6085.5 and λ6085.9, respectively. According to Merrill (1950) the forbidden iron line is present in spectra of the symbiotic stars CI Cygni and Z Andromedae; we have a northern red objective-prism plate of the latter star and, indeed, the wavelength coincidence is exact for the line near λ6080 in Z And and Henize 38. We have no suggested identification for the line near λ6850 in Henize 38. The near-infrared plates (3500 A/mm at A-band) of this object show a very strong continuum, particularly beyond λ8000, however no TiO bands are evident.

The other object we wish to report as a probable symbiotic star is uncatalogued. It was found on a IIa-O objective-prism plate (taken in July 1969) and has λ5007 and λ4363 emission with perhaps a trace of λ4959 and Hγ emission and no continuum; if the density of λ4363 = 1.0, then λ5007 ≈ 1.2. The approximate position for 1900 is: $17^h38^m.9$, $-2^\circ04'$. We have no red or infrared plates of this object. Sanduleak (1972) has examined the object on two low-dispersion blue objective-prism plates taken with the Burrell Schmidt telescope of Case Western Reserve University and reports that the emission lines are absent on the plate of June 2/3 1959, but that on June 25/26 1959 there were three emission features present: if the density of Hβ = 1.0, then λ5007 ≈ 1.5, and λ4363+Hγ ≈ 3. The densities on the latter plate indicate a substantial change from those mentioned above. Sanduleak also has a red objective-prism plate showing sharp Hα emission with no continuum.



The finding chart for this object was drawn by hand from the red print of the Palomar Sky Survey; the object is 153.5 mm W of the E edge and 62.8 mm N of the S edge of the red print at 0^{o} $17^{h}36^{m}$. Examination of the object on the blue and red Palomar prints shows that it is brighter in the red and that there is some faint nebulosity associated with it.

This work was supported by the National Science Foundation.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 735

Konkoly Observatory
Budapest
1972 November 3

THE PERIODS OF SIX RR LYRAE TYPE STARS

Students at the Maria Mitchell Observatory have obtained new or confirmed periods for six variable stars of type RRab, as tabulated. The unnamed stars had previously been discovered by Hoffleit.

For TX Comae, Pamela Bonnell independently found a period of $0^{d}.536477$, differing in the last place from the period found in the General Catalogue of Variable Stars. The latter period also satisfies Miss Bonnell's observations and gives better accord between the published JD of maximum and the one tabulated here.

Donna Henry found that either of two periods satisfies her observations of EL Comae on approximately 100 plates taken between 1964 and 1972, although the shorter of the two is slightly preferred.

The final variable, in Sagittarius, was found by Pamela Knight to have a changing period. The phases in decimal parts of the period, for some 500 observations from 1924 through 1972 are well represented by the relation,

$$\phi = 1.906186(\mathrm{JD} - 31674.200) - n - 1.9 \cdot 10^{-10} n^2,$$

whence $\mathrm{Max} = 31674.200 + 0.524608n + 10^{-10} n^2$.

Miss Bonnell, a Vassar College student, worked under NSF Grant GP 30065 in the summer of 1971. Miss Henry and Miss Knight were NSF Undergraduate Research Participants from Wellesley College in the summer of 1972.

28 October 1972

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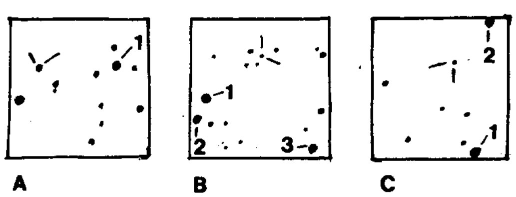
Maria Mitchell Observatory
Nantucket, Mass., U.S.A.

Var	R.A. (1900) Dec.	Max	Min	JD (max)	Period	Observer
A	$11^h56^m28^s + 32^\circ 27'.4$	13.3	14.3	40382.627	$0^d.61031$	D.Henry
B	12 00 51 + 28 12.6	13.7	15.8	39268.617	0.444766	D.Henry
TX Com	12 45 10 + 31 41.0	13.5	14.8	40738.633	0.536470	P.Bonnell
C	12 46 21 + 33 30.0	12.4	13.9	40022.531	0.57465	D.Henry
EL Com	12 46 35 + 24 40.1	13.8	15.0	38532.557	0.343329 or 0.52362	D.Henry
77^x	18 20 13 - 21 16.8	12.5	14.3	31674.200	$0.524608 + 10^{-10}n$	P.Knight

^{x}Number as in IBVS 660, 1972.



A 1 = BD +32°2211
B 1 = +28°2077
2 = 2078
3 = 2075
C 1 = +33°2278
2 = 2277

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 736

Konkoly Observatory
Budapest
1972 November 8

OBSERVATIONS OF UV CETI DURING THE 1972 OCTOBER 1-15 INTERNATIONAL PATROL

During part of the International Patrol of 1972 October, UV Ceti was observed for a total of 26.5 hours resulting in 50 detected flare events. All photoelectric observations were obtained on the 76-cm reflector at McDonald Observatory. A few time-resolved spectroscopic observations were also obtained by B. W. Bopp on the 208-cm Struve reflector at McDonald Observatory. This report is only preliminary. A complete discussion of these observations will be published at a later date.

INSTRUMENTATION

The photoelectric observations were obtained with a high speed pulse counting photometer using a specially selected Amperex 56 DVP photomultiplier tube operated uncooled. The basic instrument is described by Nather and Warner 1971 (1).

In most cases, no filter (NF) was used in order to study very rapid variations during flare events (2). With no filter employed, the band-pass of the system is defined by the spectral response of the

Amperex 56 DVP. The photocathode is a bialkali type D which has a maximum response (25% Q.E.) at 4000 Å, and half response points at 3100 and 5200 Å.

When using integration times of less than one second, the data is stored in the computer's memory (8K). Approximately two hours are required to dump the memory onto paper tape and, for this reason, some flares were observed for which the data was not saved. These flares are indicated by (*) in Table 2.

OBSERVATIONS

Table 1 gives the exact times (UT) of the observations. Sky readings are included in these intervals but since a sky measurement required only 10 seconds the coverage can be considered almost complete over any time interval.

Table 2 gives preliminary values of some flare characteristics of the observed events. Columns 3 and 4 give the heliocentric Julian date and Universal Time (with heliocentric time correction included) of the peak intensities. Approximate heliocentric time corrections for UV Ceti are given below:

72 OCT 10	+447s
72 OCT 11	+446s
72 OCT 13	+445s
72 OCT 14	+444s
72 OCT 15	+443s

Column 5 contains the maximum flare intensity defined by:

$$I_{max} = \frac{I_o + I_{flare}}{I_o} - 1$$

where I_0 is the intensity of the star a short time before the onset of the flare. Column 6 was included to conform to suggestions made by the IAU Working Group on Flare Stars (3). It should be noted that for pulse counting observations, this term ($3\sigma/I_0$) overestimates the error associated with the peak intensity since it does not take into account that the photon noise is a function of the count rate. Column 7 is the total relative energy (R.E.) of the flare event. The unit of relative energy is the amount of energy radiated by the quiescent star in the stated bandpass in one second. The integration time (IT) is stated in column 8.

The University of Texas at Austin — T. J. MOFFETT
and — B. W. BOPP
McDonald Observatory
October 30, 1972

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(3) Chugainov, P.F. 1971, IBVS No. 605.

TABLE 1

COVERAGE OF UV CETI

UT DATE	FROM (UT)	TO (UT)	ΔT (s)
72 OCT 10	05 46 30	06 21 00	2070
	06 25 36	07 09 53	2657
	07 11 15	07 42 56	1901
	07 43 07	08 17 03	2036
	08 17 11	08 47 12	1801
	08 48 13	09 22 11	2038
72 OCT 11	03 58 00	04 34 15	2175
	04 37 44	05 07 56	1812
	05 08 05	05 38 07	1802
	05 38 16	06 08 18	1802
	06 08 25	06 31 26	1381
	06 37 30	07 07 31	1801
	07 07 40	07 37 41	1801
	07 37 48	08 07 51	1803
	08 08 00	08 47 30	2370
	08 48 12	09 14 59	1607
	09 16 03	09 37 44	1301
72 OCT 12	03 55 57	04 50 12	3255
	08 04 00	09 48 00	6240
72 OCT 13	03 23 00	03 26 00	180
	03 30 16	04 31 06	3650
	04 31 50	05 01 50	1800
	05 02 01	05 32 01	1800
	05 34 00	06 12 35	2315
	06 17 38	06 47 38	1800
	06 48 16	07 18 16	1800

	07 18 46	07 48 46	1800
	07 48 53	08 18 53	1800
	08 20 01	08 50 01	1800
	08 50 07	09 20 07	1800
	09 20 14	09 50 14	1800
72 OCT 14	03 25 02	03 55 02	1800
	03 55 12	04 25 12	1800
	04 25 18	05 09 46	2068
	05 22 00	06 52 30	5430
	06 56 42	07 26 59	1817
	07 31 27	08 04 54	2007
	08 05 04	08 39 30	2066
	08 39 39	09 27 59	2900
72 OCT 15	03 47 14	04 27 17	2403
	04 27 26	04 58 21	1855
	05 00 07	05 30 16	1809
	05 38 00	07 15 00	5407

SUMMARY

UT DATE	TOTAL TIME (s)	TOTAL TIME (hr, min, s)
72 OCT 10	12503	03 28 23
72 OCT 11	19655	05 27 35
72 OCT 12	9495	02 38 15
72 OCT 13	22345	06 12 25
72 OCT 14	19888	05 31 28
72 OCT 15	11474	03 11 14

TABLE 2

Flare Characteristics

UV CETI

FLARE NO.	UT DATE	$JD_{\odot}$ 2441600.+	$(UT)_{\odot}$	I_{max}	$3\sigma/I_{o}$	R.E.	IT	F
1	72 OCT 10	0.748596	5 57 58.7	.86	.15	4.35	0.25	NF
2		0.790763	6 58 41.9	.14	.08	5.56	1.00	NF
3		0.797916	7 8 59.9	.27	.08	2.13	1.00	NF
4(1)		0.798958	7 10 30.0	.17	.08		1.00	NF
5(1)		0.799085	7 10 40.9	.14	.08	12.51	1.00	NF
6(1)		0.799236	7 10 54.0	.38	.08		1.00	NF
7		0.857453	8 34 43.9	.51	.07	6.73	1.00	NF
8		0.861990	8 41 15.9	.14	.07	0.41	1.00	NF
9		0.866446	8 47 40.9	.58	.07	9.51	1.00	NF
10		0.877476	9 3 33.9	1.08	.09	23.23	1.00	NF
11		0.892916	9 25 47.9	.18	.09	3.31	1.00	NF
12	72 OCT 11	1.674280	4 10 57.8	.29	.21	2.44	0.25	NF
13		1.681595	4 21 29.8	1.81	.21	22.55	0.25	NF
14		1.701731	4 50 29.6	.17	.09	6.43	1.00	NF
15		1.713259	5 7 5.6	.31	.09	7.70	1.00	NF
16		1.758108	6 11 40.5	.13	.10	1.12	1.00	NF
17		1.764983	6 21 34.5	.26	.09	4.35	1.00	NF
18		1.772448	6 32 19.5	.15	.09	4.80	1.00	NF
19		1.791626	6 59 56.5	.23	.09	18.81	1.00	NF
20		1.802726	7 15 55.5	.95	.09	5.81	1.00	NF
21		1.857818	8 35 15.5	.73	.09	90.10	1.00	NF
22		1.865028	8 45 38.4	.24	.09	6.36	1.00	NF
23		1.866568	8 47 51.5	.47	.09	59.64	1.00	NF

FLARE NO.	UT DATE	$JD_{\odot}$ 2441600.+	$(UT)_{\odot}$	I_{max}	$3\sigma/I_o$	R.E.	IT	F
24		1.875353	9 00 30.5	.57	.09	10.03	1.00	NF
25		1.878952	9 5 41.5	.22	.09	9.20	1.00	NF
26		1.885654	9 15 20.5	.21	.09	13.10	1.00	NF
27		1.887656	9 18 13.5	2.73	.09	39.33	1.00	NF
28	72 OCT 13	3.742235	5 48 49.1	.52	.19	21.81	0.25	NF
29		3.747246	5 56 2.1	.52	.19	15.69	0.25	NF
30		3.818568	7 38 44.3	.22	.10	2.13	1.00	NF
31		3.839285	8 8 34.2	.16	.09	4.63	1.00	NF
32		3.856970	8 34 2.2	1.19	.10	58.05	1.00	NF
33		3.858105	8 35 40.3	2.91	.10	306.59	1.00	NF
34		3.873706	8 58 8.2	1.37	.10	25.25	1.00	NF
35		3.898022	9 33 9.1	.42	.11	24.37	1.00	NF
36	72 OCT 14	4.700006	4 48 0.5	.21	.09	4.86	1.00	NF
37*		4.734311	5 37 24.5	--	--	--	0.25	NF
38		4.771767	6 31 20.7	1.43	.16	40.24	0.25	NF
39		4.776767	6 38 32.7	.40	.16	5.80	0.25	NF
40 (2)		4.823257	7 45 29.4	3.39	.81	450.59	1.00	U
41 (2)		4.859380	8 37 30.4	8.15	.70	606.99	1.00	U
42 (2)		4.868407	8 50 30.4	127.11	.78	5068.99	1.00	U
43 (2)		4.892006	9 24 29.3	1.74	.78	51.51	1.00	U
44		4.894148	9 27 34.4	1.37	.78	119.26	1.00	U
45*	72 OCT 15	5.750561	6 00 48.0	--	--	--	0.25	NF
46* (2)		5.759994	6 14 23.0	--	--	--	0.25	NF
47* (2)		5.766938	6 24 00.0	--	--	--	0.25	NF
48* (2)		5.771452	6 30 53.0	--	--	--	0.25	NF
49* (2)		5.778917	6 41 38.0	--	--	--	0.25	NF
50* (2)		5.800271	7 12 23.0	--	--	--	0.25	NF

NOTES:

(1) FLARE NO. 4, 5 and 6 are included in the relative energy of No. 5

(2) Spectra

(*) ORIGINAL DATA NOT SAVED. SMALL FLARE $I_{max} < 0.2$.

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NUMBER 737

Konkoly Observatory
Budapest
1972 November 14

THE SECONDARY PERIOD OF RV CAPRICORNI

Although RV Cap is one of the brightest RRab stars showing Blashco-effect, it was not yet photoelectrically observed. From his visual observations Tsessevich (Trudi GAIS 23,1953) gave a secondary period of 221,86 days for this star which was the longest one known among the RRab variables.

During several stays at the Catania Astrophysical Observatory on Aetna in the years 1970-71-72 I carried out photoelectric observations of the star to determine a more accurate length of its secondary period.

The observations were taken with the Cassegrain reflector of 61 cm aperture and 600 cm focal length, equipped with a three colour synchronous-photometer containing EMI 6256 photomultiplier tubes.

Together 15 ascending branches and maxima were obtained well distributed over the phases of the secondary period, for which I have got the value:

$$P' = 138\overset{d}{.}3$$

This period is much shorter than that given by Tsessevich,and even if it remains the longest secondary period so far known for RRab variables, it is now much better fitting the distribution of the lengths of secondary periods.

The Table contains the observed maxima in three colours ΔMy, ΔMb and ΔMu and their elements:

$$\text{Max.hel.} = 2439032,819 + 0\overset{d}{,}44775015 \ E \qquad (1)$$

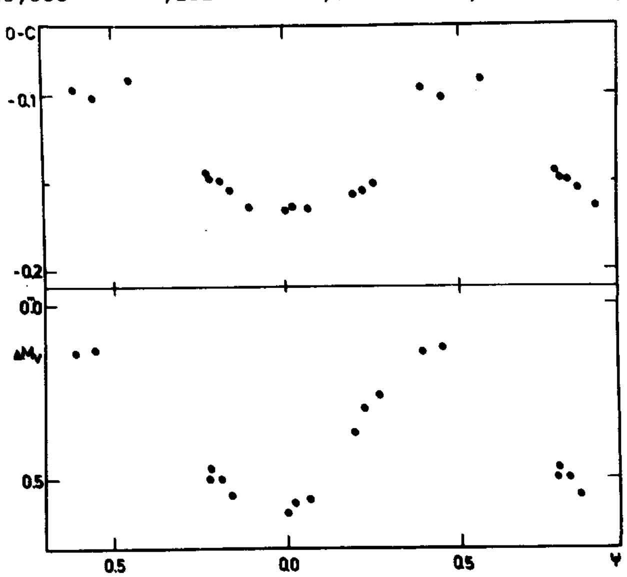
In the Figure the values of ΔMv and O-C are plotted against the phase of the secondary period computed by the formula

$$\text{Lowest Max.} = 2441177.71 + 138\overset{d}{,}3 \ N \qquad (2)$$

While there is only insignificant scattering at highest amplitudes in the ΔMv-values, at the same phase the O-C values indicate a larger scattering resulting from the double hump appearing at these maxima of the light curve, like in the case of AR Her.The height of the humps are changing, one is increasing when the other is decreasing, and in a certain moment the maximum of the light curve jumps from one hump to the other one.

I am very grateful to Prof. G. Godoli for having given me opportunity for observing in the Catania Observatory and I thank very much Prof. M. Rodonò, S. Catalano and Dr.Blanco for making the observations, when I could not take part in them.

J.D.max.	O-C	ΔMy	ΔMb	ΔMu
2440				
721,62:	-0,092	-	-	-
790,520	,157	+0,37	-0,13	-0,21
794,552	,155	+0,30	-0,20	-0,30
798,587	,151	+0,26	-0,22	-0,38
41146,554	,144	+0,50	0,0	-0,05
147,446	,148	+0,47:	0,0	-0,05:
151,475	,149	+0,50	+0,01	-0,06
155,500	,154	+0,55	+0,05	-0,01:
163,551	,164	-	+0,03	-0,10
173,41:	-	-	+0,07	-
177,431	,166	+0,60:	+0,105	+0,04:
180,568	,164	+0,57:	+0,085	-0,03
186,388	,165	+0,56	+0,085	-0,02
41507,478	,097	+0,14	-0,46	-0,70
515,533	,102	+0,13	-0,39	-0,61



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Konkoly Observatory
Budapest
1972 November 15

S 10764 - A SLOWLY VARIABLE OBJECT IN THE GLOBULAR CLUSTER M3 WITH $U-B\approx -1^{m}.0$

On plates taken with the Tautenburg 134 cm Schmidt telescope I discovered a slowly varying object S 10764 which highly probably is a physical member of M3.

Cordinates (1855.0): $13^{h}35^{m}29^{s}$ $+29^{\circ}13'$

By comparison with the standards of Johnson and Sandage (ApJ 124,p.379) the following limits of the variations were measured:

	U	B	V
maximum	17.3	18.3	17.9
minimum	18.8	19.8	18.9

For further details see next number of MVS.

Figure 1 shows the new variable in its surroundings; in figure 2 the positions of the star in the V/B-V diagram (l.c.) are given.

I thank the staff of the Karl-Schwarzschild-Observatorium Tautenburg for lending their plates.

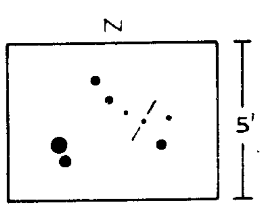

Fig. 1

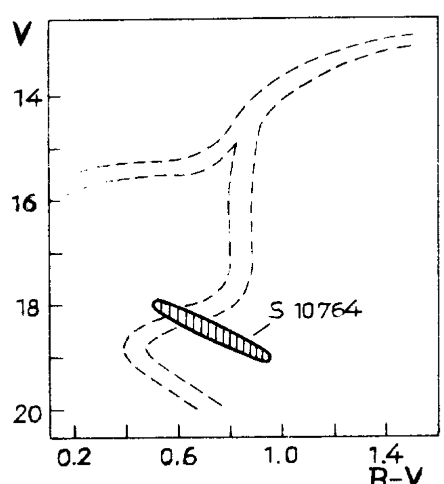

Fig. 2

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VISUAL OBSERVATIONS OF EV LACERTAE

The flare star EV Lac was observed visually for a total of 13.3 hours during the September 1972 international programme by members of the Variable Star Section of the British Astronomical Association. Hours of coverage are given below, parentheses indicating poor sky conditions.

1972		U.T.	Observers
Sep.	1	2115 - 2215	R.J.Livesey
	2	2100 - 2234	RJL,H.W.Smith
	4	2107 - 2253	RJL, HWS
	5	2156 - 2225	HWS
	6	(2128 - 2208)	HWS
	7	2100 - 2200	RJL
	8	2059 - 2202	RJL
	9	2025 - 2125, 2152 - 2308	RJL
	10	2129 - 2212	RJL, HWS
	11	2041 - 2045, (2045 - 2145)	HWS, RJL
	14	2112 - 2157	HWS
	15	(2225 - 2325)	RJL

Two possible flares were recorded by Smith, outside the interval of simultaneous coverage by Livesey:

1972		U.T.	Amplitude	Duration
Sep.	10	$21^h36^m.0$	$0^m.5$	21^m
	10	22 06.2	0.8	22

Total coverage 13^h20^m over 12 nights.

British Astronomical Association

J.E. ISLES

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Konkoly Observatory
Budapest
1972 November 16

ON THE VARIABILITY OF THE MIRA STAR UX CYGNI

On two occasions the Mira variable UX Cygni has been reported to vary in brightness by more than one magnitude on time scales of one hour or less. The first report (1) described a decrease in brightness by 1.4 magnitudes within 12 minutes. The second (2) indicated an increase by 1.3 magnitudes within one hour. The first instance occurred 38 days before the 1933 visual maximum, and the second occurred 21 days before the 1944 maximum.

In an attempt to refine the description of this phenomenon and to investigate the extent to which the variation persists to very short time scales, we observed UX Cygni with the high speed pulse-counting photometer at the McDonald Observatory (3). The observations were obtained on the 76-cm reflector. The detector was a specially selected Amperex 56 DVP photomultiplier, operated uncooled and generally without a spectral filter.

The variable was observed with time resolutions between one and five seconds for a total of 12.5 hours on four nights. Table I gives the coverage times. Visual inspection of the data showed that no variations larger than 0.05 magnitude occurred on time scales less than two hours. Our data are not suitable for investigation of longer time scale variability, although we did observe a slow increase in brightness from night-to-night, consistent with the expected Mira-type variability.

On three nights, observations were made in V of the UBV system in order to determine the date of visual maximum. From these results (Table II) we estimate the date of maximum to have been 1972 Sep 18 ± 4, which is in agreement with the AAVSO predicted date 1972 Sep 14(4). The phases in Table II were computed using the observed date of maximum and the period of 561.24 days (5).

The bulk of our high speed observations refer to a time 19 ± 4 days before maximum. This is very close to one of the phases at which rapid variations had been noted previously (2). Since we observed no rapid variability, we conclude that such variations are not strictly phase dependent and/or that following a rapid variation, perhaps during the intervals when we were not monitoring the star, the variable soon recovers to a high precision the brightness it had prior to the rapid event.

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THOMAS G. BARNES, III.

TABLE I

UT DATE	BEGIN (UT)	END (UT)	TOTAL COVERAGE
1972 Aug 29	$03^h44^m46^s$	$04^h02^m01^s$	
	04 41 02	09 05 52	$04^h42^m05^s$
1972 Aug 30	03 30 36	04 29 26	
	04 30 19	05 01 19	
	05 01 37	05 27 17	
	05 28 27	06 01 12	
	07 16 47	07 35 02	
	07 35 09	09 15 59	04 27 30
1972 Aug 31	03 07 38	03 10 33	
	03 21 29	03 35 24	
	04 38 36	05 45 16	
	05 46 32	06 23 37	
	07 39 09	08 58 09	03 19 35
1972 Sep 01	$08^h37^m00^s$	$08^h40^m45^s$	03^m45^s

TABLE II

UT DATE	JD	V (mag)	PHASE
1972 Aug 29	2441558.5	11.27	0.97
1972 Oct 01	2441591.5	9.51	0.03
1972 Oct 16	2441606.5	9.98	0.05

References:

1. Osvalds, V. 1955, Publ. Ast. Soc. Pacific, 67, 417.
2. Mayall, M. W. 1956, Jour. Roy. Ast. Soc. Canada, 50, 135.
3. Nather, R. E. and Warner, B. 1971, Mon. Not. Roy. Ast. Soc., 152, 209.
4. Amer. Assoc. Var. Star Observers, Bulletin No. 35, 1972.
5. Kukarkin, B. V., Kholopov, P. N., Efremov, Yu. N., Kukarkina, N. P., Kurochkin, N. E., Medvedeva, G. I., Perova, N. B., Fedorovich, V. P., and Frolov, M. S. 1969, General Catalogue of Variable Stars (3rd ed.; Moscow: Academy of Sciences of the U.S.S.R.).

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1972 November 21

MINIMA OF ECLIPSING VARIABLES

Eclipsing variables were observed visually by members of Polskie Towarzystwo Miłośników Astronomii,Centralna Sekcja Obserwacji Gwiazd Zmiennych (Polish Amateur Astronomical Society, Central Section of Observations of Eclipsing Variables) mainly during special meeting in Niepołomice and Lanckorona near Cracow.

The heliocentric moments of minima and limits of errors were determined by tracing-paper method.The (O-C) values were computed using the elements given in "Rocznik Astronomiczny Observatorium Krakowskiego 1972"

Letter n after moments of minima denotes normal minima, letter s - secondary minima. N - denotes number of observations, : - denotes uncertain determination of the moment. Observers'names are given in the last column.

Cracow, November 1972

PIOTR FLIN
Cracow University
Astronomical Observatory
and
Polish Amateur Astronomical
Society Central Section
of Observations of Eclipsing
Variables.

	J.D.hel			N	O-C	Observer
OO AQL	2441539^d.408	s	±0^d.005	16	-0^d.005	L.Frasiński
	539.422	s	0.008	12	+0.009	K.Szlachcic
	542.453	s	0.006	17	0.000	L.Frasinski
V 346 AQL	2441544.425		0.006	16	-0.016	W.Załuski
	544.427		0.004	19	-0.014	A.Maruszak
	544.430		0.006	19	-0.011	P.Turkowski
	544.432		0.007	19	-0.009	M.Trzyniec
	544.436	n	0.013	28	-0.005	T.Bryczkowska
	544.437	n	0.006	26	-0.004	L.Frasiński
	544.439		0.008	16	-0.002	K.Drozd
AR AUR	544.525	:	0.010	15	+0.006	W.Załuski
RZ CAS	542.498		0.004	13	-0.005	W.Caban
	560.433		0.003	14	+0.001	W.Załuski
	578.358		0.004	8	-0.003	W.Sędzielowski
XX CAS	542.443	:	0.011	14	-0.011	L.Frasiński
	542.450	:	0.009	14	-0.004	K.Szlachcic
AB CAS	477.449	n	0.009	28	+0.028	A.Kluzik
V 401 CYG	543.408	n	0.008	21	+0.049	L.Frasiński
	543.701s	n :	0.015	17	+0.045	L.Frasiński
UX HER	543.396		0.006	13	+0.003	L.Frasiński
	543.398		0.007	15	+0.005	W.Załuski
V 338 HER	544.475		0.006	15	+0.021	K.Szlachcic
	544.476		0.004	17	+0.022	L.Frasiński
EE PEG	559.494	n	0.011	26	-0.005	W.Załuski
ST PER	578.517		0.004	8	+0.005	W.Sędzielowski
Z VUL	560.441		0.004	13	+0.009	W.Załuski

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Konkoly Observatory
Budapest
1972 November 27

SPECTRAL CHANGES IN V 1057 CYGNI

Since the discovery by G. Welin (1) that the object V 1057 Cygni in late 1969 underwent remarkable changes in brightness and spectral appearence, this object has been followed with great interest. Prior to the outburst, V 1057 (LkHα 190) was known as an advanced T Tauri type star (Herbig (2)) showing only moderate light variations (see summary by G. Welin (3)). Since September 1970 the star has changed both in brightness and spectral type.

During 1970 the brightness of the star remained fairly constant (Meinunger and Wenzel (4)) but declined monotonically during 1971. Various estimates of spectral type indicate that the star may have changed from approximately B3 (Sept. 70) to early F (mid-1972) and the luminosity class has been estimated to III or III-IV over the period; see G.Haro (5) for a summary. Spectral peculiarities and anomalous line shifts have been reported by G.H. Herbig and E.A. Harlan (6).

In view of the extraordinary changes that are taking place on this star it is important to observe the star continuously and to present all information that may be important for describing and understanding the rapid evolutionary change of V 1057 Cyg. The following is a preliminary report on the spectral properties of the star as derived from a number of spectrograms taken in 1971 and 1972 at the Stockholm and McDonald Observatories.

Table 1

No.	Date		Instr.	Image-tube	Disp. Å/mm	Spectral region	Spectral type	Lum. class
1	23/4	1971	S	yes	33	Hβ to Hγ	A5 - A7	~ IV
2	24/4	1971	S	yes	33	Hβ to Hγ	A5 - A7	~ IV
3	20/8	1971	McD	yes	100	blue	~ A7	
4	22/8	1971	McD	yes	100	blue	~ A7	
5	24,25/4	1972	S	no	59	blue		
6	7,8,10/5	1972	S	no	59	blue	F0 and F5	III
7	11,12,15/5	1972	S	no	59	blue	F0 and F5	III
8	5/10	1972	S	yes	39	blue		
9	16/10	1972	S	yes	39	blue	~ F1	
10	16/10	1972	S	yes	39	blue	~ F1	
11	17/10	1972	S	yes	59	red		

Table 1 gives date of observation and instrumentation and dispersion used (S refers to the 1 m reflector of the Stockholm Observatory, McD to the 82-inch reflector of the McDonald Observatory). A few spectrograms were exposed for several nights. No displacement of the iron comparison spectrum was noted over these nights. The resolution for the spectrograms taken with image tube is lower than for those taken without.

The spectrograms were classified on the MK system. Spectral types and luminosity classes are given in Table 1. The spectrum of V 1057 Cyg is rather peculiar and as a consequence the spectral class will be dependent on which criteria are chosen. The lower Balmer lines are broad and shallow and apparently variable in structure (see below) and the K line of Ca II is relatively narrow. As is demonstrated below both the Balmer lines and the K line are in general displaced to the violet. These lines are obviously related to an expanding shell, the metallic lines may be more representative for the stellar object. In our material a spectral classification based on the appearance of the Balmer lines and the K line give an earlier spectral type than what is obtained from the metallic lines. The following is a short description of each spectrogram.

Nos. 1 and 2: Hβ and Hγ broad, no outstanding emission lines present. The metallic line spectrum is well developed indicating a later spectral type than found by others for April - May 1971. The ratio of λ4481 to λ4417 indicates a luminosity fainter than class III.

Nos. 3 and 4: Only a rough estimate of spectral type can be made on this low dispersion spectrogram.

No. 5: Unwidened spectrogram. The spectrum is not conspicuously different from Nos. 6 and 7.

Nos. 6 and 7: The hydrogen lines are strong and broad indicating a spectral type of about F0. The G band is, however, well developed. This together with the appearance of the metallic lines yields spectral type F5, which we feel is more representative for the stellar object. The ratios of λ4172 to λ4226 and λ4417 to λ4481 indicate a luminosity class of III. The profiles of Hγ and Hδ are assymetrical, the red side being steeper than the violet. It is possible that red-displaced emission, which has been observed at Hα, produces such effects. On spectrogram No.6, Hδ is actually split in two components. On this spectrogram Hγ gives a large positive radial velocity (see below).

Nos. 8,9 and 10: The resolution does not permit a detailed study of the metallic line spectrum. Hγ and Hδ are assymmetrical but in the opposite sense as compared to Nos. 6 and 7. The spectral type F1 is derived from the Balmer lines and the K line.

No. 11: This spectrogram is of poor resolution. Weak Hα emission is present on the red side of the Hα absorption line.

These observations indicate, as suggested by Haro (5), that V 1057 Cyg is changing towards a later spectral type. Our estimates of spectral type place the star at later spectral types than found by other investigators. In a private communication to G Rieke et al. (7), G.H. Herbig reports a spectral type of A7 III for mid-1971, in close agreement with our estimates when based on the metallic line spectrum. As noted by G. Rieke et al., this spectral type would give a more congruent picture of the total visual absorption as derived from photometric and polarisation data of V 1057 Cyg.

For spectrograms Nos. 6 and 7 heliocentric radial velocities of various lines were determined. The result is summarized in Table 2 where the mean radial velocity in km/s of the Balmer lines and selected, relatively unblended metallic lines are given with mean errors. The number of lines measured is given in parenthesis. The last column gives the velocity of the Ca II K line.

Table 2

Spectrogram	Balmer lines	Metallic lines	Ca II K
No. 6	-	-12 ± 7 (6)	-116
No. 7	-57 ± 8 (6)	-24 ± 7 (5)	-169
mean of 6 and 7:		-18	-142.5

On spectrogram No. 6, Hγ and Hδ were the only Balmer lines measured. As mentioned above Hδ appears double on this plate. The violet absorption component measures -328 km/s, the central emission like feature -180 km/s and the red absorption component is centered at +4 km/s. The center of gravity of the $H\gamma$ line is displaced to the red by +48 km/s. In the computation of the mean velocity of the Balmer lines on spectrogram No. 7 the H 11 line was omitted. This line is found at +3 km/s and blends are suspected.

The mean velocity of the metallic lines is close to the velocity of -14 to -19 km/s found by G. Courtès et al. (8) and J.S. Miller (9) for the H II region NGC 7000. In April 1971, G.H. Herbig and E.A. Harlan (6) and private communication, observed several of the metallic lines together with the Balmer lines at a velocity of approximately -60 km/s. The K line, the $H\alpha$ absorption line and a few other lines were found at much more negative velocities.

Hence one cannot avoid the feeling that the region where the metallic lines are formed and which apparently was expanding by some 40 km/s in April 1971 is now settling down to the same velocity as the star itself. This reasoning builds on the assumption that the velocity of the stellar object is close to the velocity of the North America nebula in which the star is supposed to be situated. The large negative shifts observed for the K line and the Balmer absorption lines indicate that material is still driven outwards at a high rate. If the large widths of the Balmer lines are due to a velocity field in an envelope surrounding the star, then the K line is formed over a different region of the envelope. The large changes observed in the structure of the lower Balmer lines show that considerable changes occur in the envelope with time. These variations may be connected to variable Balmer emission.

The hydrogen lines and the Ca II lines are not representative for the stellar object but rather the "chromospheric" or circumstellar regions. Therefore spectral classifications derived from low dispersion spectrograms and based mainly on the appearance of the hydrogen lines and the Ca II lines tell us very little about the temperature characteristics of the stellar object.

We are very much indebted to Dr. Aina Elvius who took the first spectrograms of the star and to several observers at the Stockholm Observatory who participated in the observations.

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Budapest
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POLARIMETRIC OBSERVATIONS OF R CORONAE BOREALIS

Multicolour polarimetric observations of R CrB were carried out in April-June and August-September, 1971, and in June, 1972. In 1971 the star was in quiet state (maximum brightness), and during the 1972 period of our observations it was in minimum (at the stage of rise of the brightness, 3 months after the beginning of the active phase). Measurements have been made on the 70 cm reflector at the Main Astronomical Observatory of the Ukrainian Academy of Sciences and on the 122cm reflector at the Crimean Astrophysical Observatory with the photoelectric polarimeter built at Kiev (Bugayenko et al. 1968). The method of observations and reduction is similar to that described by us earlier (Kolotilov, Orlov and Rodriguez, in press). The standard errors of the values p cos2θ and p sin2θ (p is the amount of polarization, and θ is the position angle of the plane of vibration) are 0.02 - 0.06%. The filters used for observations during maximum brightness had the following band halfwidths: 300A for λ3730; 650A for λ7650; 120-200A for other (interference) filters. During the minimum wide filters with halfwidths of 650-800A were used.

The results are given in the Table. The value of polarization of R CrB at maximum brightness is in good agreement with the data by Serkowski and Kruszewski (1969) obtained in January-March, 1968 in the UBV system, as well as with the Behr's catalogue (Behr 1959) where values of p and θ are given for a wide spectral band, 3500-6000A. These values are also represented in the Table. There are no other polarimetric observations of R CrB in the phase of minimum brigthness to be compared with.

Comparison of polarization of R CrB at maximum with that of a neighbour star HD 141352 (Sp F2) at the distance of 21′ from R CrB (0.18% and 0.16% respectively, according to our observations in integral light) seems to suggest this polarization to be of interstellar origin. The observed increase of polarization and change of position angle, as well as the character of wavelength dependence of polarization at minimum indicate the appearance of intrinsic polarization during the active phase of the star.

Date	Phase	λ,A	p,%	θ,degr.	Remarks
Between 1956 and 1958	maximum	4600	0.26	131	Behr, 1959
Jan.-Mar.1968	"	U	0.17-0.22	6;53	Serkowski,
		B	0.09-0.19	95-111	Kruszewski,
		V	0.10-0,24	108-110	1969
June 1971	maximum	4120	0.10		70cm refl.
		4500	0.18		Kiev
		5040	0.32		
		6220	0.30		
		7200	0.15		
Aug.-Sept.1971	"	3730	0.11	70.8	122cm refl.
		4120	0.16	78.1	Crimea
		4500	0.18	89.9	
		5040	0.17	86.9	
		5440	0.18	91.4	
		5960	0.19	96.5	
		6220	0.22	85.5	
		6530	0.16	86.8	
		6880	0.30:	96.5	
		7650	0.18	89.3	
June 5/6-10/11	rise of	3900	0.78	135.0	70cm refl.
	bright-	4900	0.45	132.6	Kiev
1972	ness	5900	0.41	144.4	
	($\sim 8^m.7-$	7650	0.21	132.8	
	$8^m.2$vis)				

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Budapest
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IDENTIFICATION OF THE CSV 6150 WITH A GALAXY

In 1959 Becker and Purgathofer (1959) discovered a diffuse object in the field of the cluster NGC 1807.The estimates of its brightness ($11\overset{m}{.}7-16\overset{m}{.}$) on the plates and prints obtained with different instruments permited to suspect its variability; it was entered in the Catalogue of Suspected Variables (CSV 6150)(Kukarkin et al.,1965; Perova, 1964).

According to Purgathofer (1961) the star cluster NGC 1807 appears a nonphysical grouping. In this region on the Palomar prints there are many galaxies looking like CSV 6150. CSV 6150 is probably a compact elliptical galaxy. It is included by Zwicky in his Catalogue (Field No.469;$\alpha=5^{h}07\overset{m}{.}9$; $=+16^{\circ}25'$, 1950) where it is mentioned as a compact galaxy having an integral magnitude of $15\overset{m}{.}7$ (obtained with a strich-system).

This case reminds of other doubtful dicoveries of variability of the galaxies (NGC 404; Geyer, 1972).Evidently,such discoveries are connected with the observations of the extended diffuse objects under very different conditions and with different instruments (Kukarkin et al, 1972) .It is clear for galaxies, but it is not so obvious for quasars. The careful photoelectric and photographic observations of QSS 3C 273 reveal only small fluctuations in light in the last decade (Lyutyi et al. 1971; Kurochkin, 1969). Probably, this object is essentially constant.

The variability of the compact galaxy AP Lib (other unreal "variable star") is also doubtful (Kurochkin, 1972).AP Lib looks like CSV 6150 on Palomar Charts.

The variations of brightness of galaxies relative to stars probably depend on their surface brightness and concentration of the light to the centre of the galaxy.It is found by some observers that the nearby galaxies have amplitudes up to a few magnitudes; more distant and compact galaxies up to $0^m.5-1^m$; at last, for the majority of QSS the amplitudes are smaller ($0^m.2-0^m.7$). Large amplitudes were detected only for a few objects: 3 C 345, 3 C 393, 3 C 446 etc. The variations of the light of 3 C 446 looked as an outburst of unusual slow supernovae (observations in ultraviolet because of red shift; Kurochkin, 1972b).

The objects of BL Lac and OJ 287 type are probably not related to QSS; they are objects of an unusual new type with large and continuous variability (Kurochkin, 1971b).

It appears from this that the variability of the galactic nuclei (also diffuse objects with large concentration) may be fictitious (Kurochkin, 1972a).

It is necessary to make careful analysis of data on the variability of galaxies and quasars.

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Konkoly Observatory
Budapest
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PROGRAMME OF COOPERATIVE FLARE STAR OBSERVATIONS
FOR 1973

YZ CMi	30 December (1972)- 12 January
AD Leo	27 January - 9 February
V 1216 Sgr	23 June - 7 July
EV Lac	22 August - 4 September
UV Cet	20 September - 4 October

P.F. CHUGAINOV
Chairman of Working Group
on Flare Stars

A NON-EXISTENT SUSPECTED VARIABLE

One of us (W.P.B.) recently noted that star No.4527 in the Catalogue of Stars Suspected of Variability, announced by Ross in 1928, agreed fairly closely in position with the Mira variable CN Aquilae. The suspicion that the two objects might be identical was heightened by the fact that CN Aquilae should have been at maximum light at the time of Ross' positive observation. Inspection of the original plates used by Ross (by W.v.A.) leaves no doubt that his star was, in fact, CN Aquilae. Suspected variable No. 4527 thus does not exist.

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"Rosemary Hill Observatory, Department of Physics and Astronomy, University of Florida, Gainesville, Florida Contribution No.34."

NOTES ON BV1481=AA CETI

The variable star BV1481 (1950.0: $\alpha = 1^h54^m40\overset{s}{.}6$, $\delta = 23°9'44\overset{''}{.}9$), now named AA Ceti (Kukarkin et al., IBVS Nr.717), was discovered to be a variable on Bamberg patrol plates (IBVS Nr.586), and a set of light elements were calculated from times of faint light derived from these plates (IBVS Nr.587). Extensive photoelectric observations with the 30" reflecting telescope at the University of Florida's Rosemary Hill Observatory have shown these elements to be incorrect. A new period has been found based upon five times of minimum in each color determined by the Hertzsprung method, five estimated times of minimum from partial coverage of only one branch of an eclipse, and the best times of faint light determined from the Bamberg plates (1964-1969). These data and the weights applied in a linear least squares calculation are shown in Table 1. The resulting elements and probable errors are:

$$\text{Min I} = \text{JD(hel.)}\ 2441268.6869 = 0\overset{d}{.}53617353.E$$
$$\pm.0007 \qquad \pm.00000050$$

The observed minus the calculated times of mid-eclipse are also given in Table 1 and are displayed graphically in Figure 1.

Over 250 observations in each color (UBV) have been made on 14 nights all tending to support the fact that these elements are correct. The light curve shows continuous variation between eclipses and the secondary eclipse is total.

Table 1

Julian Date (hel.)	E	Weight	O-C
2438728.319	-4738.0	2	+0.022
38995.594	-4239.5	1	+0.015
39006.549	-4219.0	1	-0.022
39060.417	-4118.5	1	-0.039
39383.507	-3516.0	1	+0.006
39404.394	-3477.0	2	-0.018
39444.359	-3402.5	1	+0.003
39761.491	-2811.0	2	-0.012
39768.483	-2798.0	1	+0.010
39771.463	-2792.5	1	+0.041
40530.392	-1377.0	1	+0.016
40566.285	-1310.0	2	-0.015
41261.7176	- 13.0	5	+0.0010
.7176	- 13.0	5	+0.0010
.7155	- 13.0	5	-0.0011
41264.6665	- 7.5	4	+0.0009
.6687	- 7.5	4	+0.0030
.6664	- 7.5	4	+0.0008
41268.6866	0.0	5	-0.0003
.6869	0.0	5	0.0
.6860	0.0	5	-0.0009
41281.5571	24.0	4	+0.0020
.5566	24.0	4	+0.0015
.5561	24.0	4	+0.0010
41315.6031	87.5	4	+0.0010
.6022	87.5	4	+0.0001
.6012	87.5	4	-0.0009
41317.481	91.0	2	+0.002
41563.853	550.5	2	+0.002
41607.836	632.5	1	+0.019
41620.664	656.5	2	-0.021
41630.603	675.0	3	-0.002

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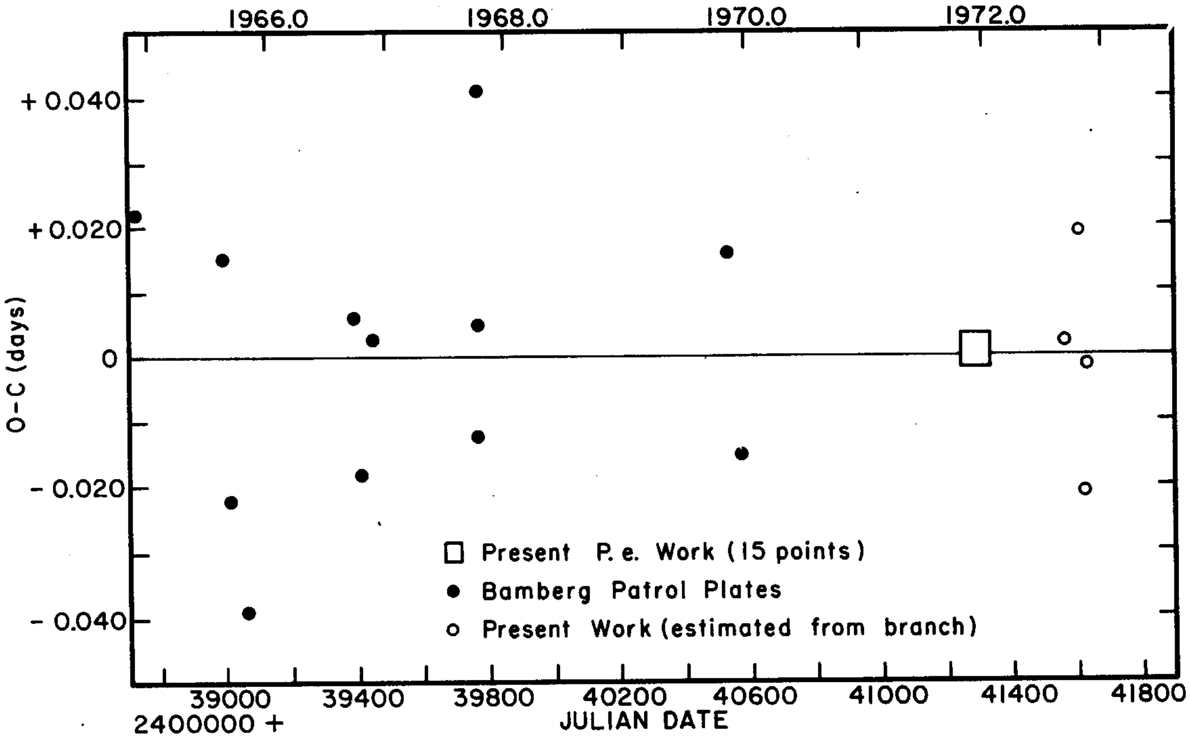
1966.0
1968.0
1970.0
1972.0
+ 0.040
+ 0.020
0
- 0.020
- 0.040
O-C (days)
Present P. e. Work (15 points)
Bamberg Patrol Plates
Present Work (estimated from branch)
39000
39400
39800
40200
40600
41000
41400
41800
2400000 +
JULIAN DATE

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EPOCHS OF PHOTOELECTRIC MINIMA OF Y CYGNI

This report concerns the Japanese contribution to the international campaign of photoelectric observations of the eclipsing variable Y Cyg in 1971 and 1972 for the epochs of the minima given by Commission 42 of the IAU during the Brighton meeting. Y Cyg is a binary system with apsidal motion, and accurate epochs of the light minima would provide with important data for study of the latter motion. Photoelectric observations were carried out with the 20 cm refractor (BV) at the Education Centre of Kanagawa Prefecture, the 25 cm reflector (UBV) at the Akita University, the 20 cm refractor (BV) at the Education Centre of Saga Prefecture and the 91 cm reflector (UBV) at the Dodaira Station of Tokyo Astronomical Observatory. In the observations BD +34°4196 (O'Connell 1971) was used as comparison star. The following eleven epochs of minima were obtained from these observations:

Date	JD (hel.) 2441...	min	E	(O-C) 1	(O-C) 2	Observer*	Observatory **
1971							
Aug. 28	192.2044	odd	10565	+0^{d}.1277	+0^{d}.0040	H,S;Kt,Oz	A;D
Sep. 15	210.1848	odd	10571	+0.1301	+0.0069	H,S;Kt,Oz	A;D
1972							
July 18	517.0692	even	10674	-0.1098	-0.0095	Og	K
July 24	523.0605	even	10676	-0.1112	-0.0111	Og, O, K	K
Aug. 8	538.0430	even	10681	-0.1103	-0.0108	Og, O, K	K
Aug. 14	544.0353	even	10683	-0.1107	-0.0113	Og, O, K	K
Sep. 4	565.0145	even	10690	-0.1058	-0.0071	H, S	A
Sep. 10	571.007	even	10692	-0.1060	-0.0075	H, S	A
Oct. 4	594.9784	even	10700	-0.1053	-0.0076	Kg	S
Oct. 13	603.9644	even	10703	-0.1083	-0.0109	Kg	S
Oct. 16	606.9599	even	10704	-0.1091	-0.0118	Kg	S

*Observers: H=Hayasaka, S=Sato, Kt=Kitamura, Oz=Okozaki, Og=Ogata, O=Oba, K=Koreeda, Kg=Koga.

**Observatories: K=Kanagawa (20 cm refractor), A=Akita (25 cm reflector), S=Saga (20 cm refractor), D=Dodaira (91 cm reflector).

In calculating the O-C value for each minimum we used Dugan's formulae (1931);

$$\begin{array}{l} \text{Min I (even)} = \text{JD } 2409534.3195 \\ \text{Min II (odd)} = \text{JD } 2409535.8175 \end{array} \Bigg\} + 2^{d}.9963331\ E$$

$$\begin{array}{l} + 0.1380 \text{ Sin } (0^{\circ}.06266\ E) \\ - 0.1380 \text{ Sin } (0^{\circ}.06266\ E) \end{array} \Bigg\} - 0.0074 \text{ Sin } 2(0^{\circ}.06266\ E).$$

On the nights og August 28 and September 15 in 1971, simultaneous observations were made at Dodaira and Akita and therefore the epochs of minimum listed for these two nights are the mean values. In the table the (O-C)1 -values were calculated with the linear formulae, while the (O-C)2 -values were calculated with the full formulae.

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M. KOGA, Education Centre of Saga Prefecture and
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MHα 73 - 59

The star MHα 73 - 59 of spectral type M (Merrill and Burwell, ApJ 112, p.72) shows strong Hα emission lines but despite its being situated in a Cepheus dark cloud "it is not at all certain that this object is related to the T Tauri stars" (Herbig and Kameswara Rao, ApJ 174, p. 401).

I estimated the star on 650 Sonneberg patrol plates of 1941 to 1972 (partly blue sensitive, partly photovisual range). I could not detect any variation larger than the normal scattering of such observations. Therefore we have to conclude that the object was constant within ± 0.15 mag. during the years mentioned.

I thank Dr. Wenzel for drawing my attention to the star.

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UV Cet

The photoelectric monitoring of the flare star UV Cet was carried out at Okayama Station during the period of 9 to 15 October 1972. The observations were made with the simultaneous three-color photometer attached to 91 cm reflector. The observational results are summarized in the Table.

Tokyo Astronomical Observatory
December 12, 1972

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Flares of UV Cet observed at Okayama

9 to 15 October, 1972.

Time of Monitoring UT 1972	Fil-ter	Time of Max.(UT)	Flares $\frac{I_{o+f}-I_o}{I_o}$	Max. Δm	P	d_b	d_a	σ
				mag	min	min	min	mag
Oct.11								
13^h38^m- 15^h54^m	V	$13^h58^m.4$	0.21	0.19	0.1	0.2	0.6	V:0.03
	B		0.89	0.69	0.2	0.4	1.5	B:0.07
16 33 - 18 31								
Oct.12								
13 06 - 18 20	V	13 49.8	0.64	0.54				
	B		2.71	1.42				
					V:1.1	0.2	8.0	
					B:2.3	0.2	8.0	
	V	13 56.8	0.17	0.170				
	B		0.86	0.647				
	V	16 24.6	>6.32	>2.1				
	B		>25.03	>3.5				
					V:>10	0.8	34.5	V:0.03
					B:>35	0.8	39.0	B:0.07
	V	16 56.5	0.30	0.28				
	B		1.65	1.05				
	V		-	-	-	-	-	
	B	17 55.6	0.56	0.48	1.1	0.4	3.7	
	V	18 10.4	0.29	0.28	0.1	0.2	1.7	
	B		1.06	0.79	0.4	0.2	2.6	
Oct.13								
13 35 - 15 30								V:0.04
15 34 - 18 30								B:0.05
Oct.14								
12 47 - 18 20	V	14 11.5	0.14	0.14	0.1	0.5	2.0	
	B		0.40	0.37	0.4	0.5	2.5	
	V	15 06.1	0.09	0.09	0.1	1.5	1.5	V:0.04
	B		0.46	0.40	0.6	1.5	2.7	B:0.07
	V	17 30.6	0.37	0.34	0.1	0.1	0.5	
	B		1.17	0.84	0.2	0.1	0.1	

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OBSERVATIONS OF SOUTHERN FLARE STARS

During the past five years several dMe stars were monitored for flare activity, and some findings have been reported earlier (Kunkel 1968a). This communication presents a second list of stars in which flare activity was noted. Candidates were drawn from Gliese's (1969) catalog of nearby stars, and lists of emission line dwarfs (Bidelman 1954, Haro 1954).

Objects found since 1970 were selected on the basis of Hβ photometry which discriminates effectively between flare active and non-active red dwarfs.

Flares were considered real if peak U-light (after subtracting the quiescent component), measured in magnitudes, was stronger than faint event detection threshold (Kunkel 1973) given by

$$U_{lim} = U_{\sigma} + 1.25 \log_{10}(T_{.5}/\Delta t) - 2.03,$$

where U_{σ} is the U-magnitude of one standard deviation, Δt is the time-constant of the data system, and was one second in all cases. The constant corresponds to a detection criterion of five standard deviations, so that the probability of spuriously detecting an event in 30 hours of monitoring should be less than one percent. Reduction methods have been described elsewhere (Kunkel 1968b, 1973).

Table 1. Data Summary

Gliese No.	Star Name	M_V	Aperture cm	Sample Duration	U_{σ}	No. of flares	Chart
206	Ross 42	10.7	90	$1^h.34$	16.5	3	G97-47
398	LFT 725	11.7	90	3.68	16.7	1	G44-27
493.1	Wolf 461	13.1:	90	2.16	16.8	3	G60-55
540.2	Ross 845	12.8	150	1.76	18.4	3	A
852A	Wolf 1561A	13.6	90	3.04	17.8	2	B
866	L 789-6	14.6	90	3.22	17.5	7	G156-31
871.1B	L 574-61	12.5	90	2.03	17.8	1	C

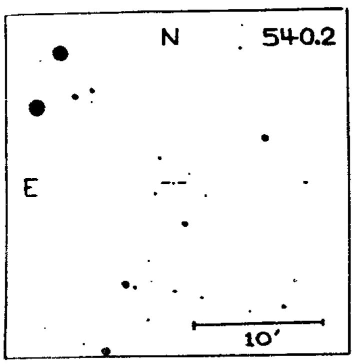

Chart A

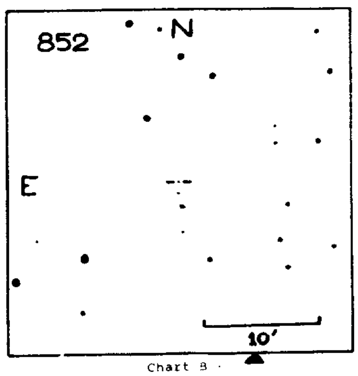

Chart B

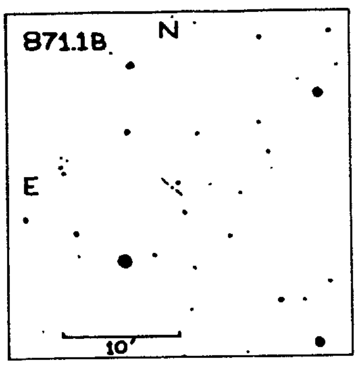

Chart C

Details of individual observations are given in Table 2, following precepts used earlier (Kunkel 1968b, 1973). It should be noted that the photometer used for the first three of these objects was not as sensitive as that employed with the other objects in the table, as the values of $\underline{U_\sigma}$ indicate. The activity of the first three stars in Table 1 is therefore greater than the number of flares observed might indicate. Had a better detection threshold been achieved, as in the last three objects, the number of detected events would have been double that obtained.

Table 2. Flare Abstract

<u>Ross 42, Gliese 206</u>

25 Nov. 1967,

$6^h51^m.6 - 7^h46^m.5$ and $7^h49^m.4 - 8^h14^m.9$ 3 events $k_u = 0.56$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
$7^h03^m.4$	1.34	15.53	0.19			–		
7 26.7	1.38	16.2	1.3	4.:		–		
7 36.7	1.42	14.22	0.46	1.5	3.1	+.23	-.34	

LFT 725, Gliese 398

7 Feb. 1969

$5^h09^m.1 - 6^h24^m.7$ no events $k_u = 0.52$

8 Feb. 1969

$3^h45^m.5 - 6^h10^m.5$ 1 event $k_u = 0.50$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
4^h56^m	1.29	16.23	2.4	-		-		

Wolf 461, Gliese 493.1

9 Feb. 1969

$7^h44^m.0 - 8^h57^m.8$ 2 events $k_u = 0.65$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
$7^h43^m.35$	1.25	15.70	.17	.8:		-		
8 30.20	1.24	16.16	.28			-		

11 Feb. 1969

$8^h10^m.8 - 9^h06^m.6$ 1 event $k_u = 0.63$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
$8^h26^m.20$	1.24	15.81	0.10	0.35		-		

Ross 845, Gliese 540.2

22 Mar. 1969

$6^h37^m.7 - 8^h23^m.5$ 3 events $k_u = 0.5$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
$7^h13^m.1$	1.00	17.45	0.17			-		
8 07.3	1.02	17.38	0.65	2.4:		-		
7 38.7	1.00	17.9:	1.8			-		

Wolf 1561A, Gliese 852A

29 Sep. 1971

$1^h02^m.0 - 4^h04^m.6$ 2 events $k_u = 0.46$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
$3^h00^m.9$	1.08	16.79	1.30	2.8:		-		
3 45.90	1.11	15.51	.24	.47	.90	+.69		

L 789-6, Gliese 866

30 Sep. 1971

$1^h10^m.0 - 1^h44^m.9$ and $1^h46^m.8 - 4^h19^m.2$ 7 events $k_u = 0.55$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
$1^h26^m.60$	1.09	14.62	.085	.13	.17	+1.41	+1.30	$T_{0.05}$=.4
1 40.31	1.08	16.13	.5	1.7		-		
2 38.65	1.04	16.58c	.08	.15c		-		Double
3 11.13	1.04	16.66	.18			-		
3 23.55	1.05	16.44	.4	2.2		-		
4 00.1:	1.08	<13.34	<.3			-		lost peak
4 11.58	1.10	15.68	.05	.11		-		

L 574-61, Gliese 871.1B

29 Sept. 1971

$4^h41^m.0 - 6^h43^m.8$ 1 event $k_u = 0.46$

Event U.T.	Air-mass	U_{peak}	$T_{0.5}$	$T_{0.2}$	$T_{0.1}$	τ_1	τ_2	Notes
$4^h57^m.02$	1.11	16.34	0.44	1.7	3.7	-.36		

At the luminosity of Ross 42 few flare stars are known of comparable activity. The present data are insufficient to form a reliable incidence statistic. However, an estimate based on the three recorded events points to an activity of $M_{u,o} \approx 14.6$, greater than that of any flare star of similar luminosity. As the star is a spectroscopic binary, an assumption of activity divided equally between like components yields a level of activity similar to that of CoD-32°16135, with $M_{u,o} \approx 15.3$ per component. The space motion of Ross 42 is similar to that of YZ CMi, CoD-32°16135 and CoD-31°17815, the stars that define the upper envelope of flare activity in the solar neighborhood. Thus a possibly common origin for these stars appears likely.

Gliese gives space motions for five of the stars in Table 1. The largest space motion is that of Number 866, with U = -67, V = -2, and W = +41 km/s. Numbers 493.1 and 852 likewise have large motions with components perpendicular to the plane significantly greater than those commonly associated with solar neighborhood flare stars. It is becoming clear that flare activity is far more common among stars of the old disk population than had once been belived.

Lastly, Shakhovskaya and Sofina (1972) have recently reported flare activity on Ross 868 (Gliese 669A), of which the fainter companion is known as a flare star (Kunkel 1967). Wolf 1561A is a second example of a situation in which the brighter component of a binary flares. No flare activity has been reported on the fainter component, which is one magnitude fainter. The conclusion, implicit in Kunkel's (1973) discussion of flare visibility, is that the preponderence of observed flare activity in the fainter components of binaries is likely to be a selection effect.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 749

Konkoly Observatory
Budapest
1972 December 30

H B V 479 - 495, VARIABLES IN A FIELD AROUND S A 18

The archive of the Lippert Astrograph contains about 150 plates of a variable star field centered on SA 18 and mainly taken in the Julian date interval 2429400-2432100. Due to other circumstances these plates neither have been searched for variables nor recent data plates gained. Processing this material 17 new variables were discovered. Four of them turned out to be rediscovered already suspected variables listed in the CSV catalogs I and II. Nevertheless they were given HBV numbers, since nothing except a confirmation of variability was known about these stars.

The results are summarized in the first table. The given accurate (1900) positions depend on measures of two sets of AGK3 reference stars, paired and crossed around each variable.

Estimates of the variables were made by Pickerings method, using a Zeiss binocular microscope with continuously zoom lens magnification. The used sequences were measured on the Becker iris-diaphragm photometer and calibrated by standard B-magnitudes of the open cluster NGC 7160 and photographic magnitudes of SA 18. (Table 2).

As far as the 8 eclipsing variables are concerned nearby minima were combined into normal minima as given under n in table 3, which table also contains the epoch number and the O-C as derived from the respective elements in table 1. For three Mira type and one RR Lyrae variables a similar table is given which presents individual

Table 1.

Summary of Data.

HBV	α_{1900}	δ_{1900}	Type	Max	Min I	MinII	E_0 2430000	P	D or ε	Sp.
479	$20^h 42^m 3^s.96$	$+62^\circ 8' 40''.6$	EB	$12^m.60$	$15^m.02$	$12^m.84$	0517.339	$3^d.3128065$	$0^P.18$:	
480	43 14.09	60 21 15.7	EB	12.16	12.57	12.20	0639.300	0.7763644		
481	21 3 52.14	63 20 21.7	M	13.7	(16.0		0662	181.5		
482	7 45.59	57 18 35.7	EB	11.42	12.61	11.69	0729.280	1.2358073	0.20:	
483	17 14.82	61 17 0.8	RCB	13.7	15.8					
484	17 15.60	60 18 0.8	EA	13.66	15.02	13.79	0517.465	0.6930642	0.16	
485	22 49.97	60 47 30.2	M	14.5	(15.7		0322	285.7		
486	28 0.23	61 16 23.7	J	11.2	11.7					K5d:
487	28 12.12	60 40 52.3	RR	14.98	15.94		0576.474	0.4306951	0.20	
488	28 20.66	63 34 10.2	EA	14.72	(15.8		0590.650	3.2655017	0.17	
489	29 16.98	61 3 29.9	EA	11.80	12.63					
490	30 17.26	57 21 36.2	RR?	14.60	15.36					
491	32 32.63	60 27 25.3	J	12.5	13.3					N
492	39 43.24	63 34 41.8	EA	15.36	16.08		0515.399	9.7181902	0.14	
493	40 5.65	63 26 8.6	EA	14.84	15.81	14.89	0974.386	1.4019731	0.16	
494	55 4.51	62 41 22.3	M	13.6	(16.3		0372	374		
495	56 3.23	62 6 36.8	EA	13.86	14.19		0693.386	1.9479836	0.17	

maxima (table 4). Normal points of mean light curves for each of the 8 eclipsing and 1 RR variables are listed in table 5 (see also figure). Additional notes on individual variables follow. The identification charts mark the variable and the used sequence stars. North is at top and East to the left. The scale is given by the length of the 5′ line.

Table 2.

Photographic Magnitudes of the Sequences

HBV	a	b	c	d	e	f	g	h
479	$12^{m}.77$	$12^{m}.54$	$12^{m}.78$	$13^{m}.40$	$13^{m}.90$	$14^{m}.20$	$14^{m}.47$	
480	11.91	12.17	12.43	12.62	12.88			
481	13.50	13.75	14.13	14.41	14.99	15.27	15.53	15.97:
482	11.15	11.40	11.71	12.02	12.51	12.86		
483	13.28	13.74	14.35	14.81	15.04	15.48	15.83	
484	13.19	13.69	14.03	14.29	14.53	14.68	14.95	15.16
485	14.30	14.59	14.83	14.99	15.23	15.43	15.68	
486	10.97	11.27	11.44	11.54	11.71			
487	14.71	15.00	15.23	15.44	15.78	15.99		
488	14.37	14.65	14.99	15.21	15.50	15.68	15.81	16.02:
489	11.57	11.90	12.27	12.54	12.73			
490	14.55	14.77	14.95	15.12	15.36	15.68		
491	12.25	12.71	12.86	13.20	13.34	13.82		
492	15.10	15.39	15.57	15.82	15.98	16.18		
493	14.50	14.82	15.11	15.31	15.64	15.95		
494	13.40	13.70	13.95	14.36	14.85	15.21	15.81	16.30:
495	13.55	13.88	14.17	14.66				

Table 3

Normal Minima of 8 Eclipsing Stars

HBV 479	n	E	O-C
242 9407.540	1	- 335	$-0^{d}.009$
243 0517.345	4	0	+ .006
1077.195	2	+ 169	- .008

HBV 480	n	E	O-C
242 9514.350	2	-1449	+0.002
243 0021.310	2	- 796	- .004
0639.300	5	0	.000
1028.258	4	+ 501	- .001

HBV 482	n	E	O-C
242 9660.310	1	- 865	0.000
243 0515.491	3	- 173	+ .005
0729.279	3	0	- .001
1028.346	2	+ 242	+ .002
2066.420	1	+1082	.000

HBV 484	n	E	O-C
242 8422,331	1	-3023	-0.001
9397.474	3	-1616	+ .001
243 0517.465	2	0	.000
1030.333	1	+ 740	.000
2066.463	2	+2235	- .001

HBV 488	n	E	O-C
242 8337.468	2	- 690	$+0^{d}.014$
9457.533	3	- 347	+ .012
243 0590.626	5	0	- .024
1028.268	3	+ 134	+ .041

HBV 492	n	E	O-C
242 9407.515	3	- 114	-0.010
243 0515.482	2	0	+ .083
1030.433	1	+ 53	- .030

HBV 493	n	E	O-C
242 8421.375	1	-1821	-0.018
243 0639.322	2	- 239	+ 008
0974.385	2	0	- .001
1061.306	3	+ 62	- .002

HBV 495	n	E	O-C
242 9372.633	2	- 678	-0.020
243 0021.341	2	- 345	+ .009
0693.367	2	0	- .019
1028.468	3	+ 172	+ .029

Table 4

Individual Maxima of M and RR Lyr Variables

HBV 481 (M) m_{pg} E O–C

242 8310:	$14^m.4$:	-13	+ 8^d
9397:	14.4:	- 7	+ 5
9580	14.4	- 6	+ 7
243 0285	14.0	- 2	-14
0650	14.4	0	-12
0846:	14.4:	+ 1	+ 2
1027	13.7	+ 2	+ 2
2122	13.9	+ 8	+ 8

HBV 485 (M)

242 8336:	14.8	- 7	+14
9464	14.5	- 3	- 1
243 0015:	15.0:	- 1	-21:
0330:	-	0	+ 8:
0621:	15.0:	+ 1	13:
0890:	15.0:	+ 2	+ 3:

HBV 494 (M)

242 9621	13.6	- 2	- 3
243 0012	13.6	- 1	+14
0390:	-	0	+18
0741	13.7	+ 1	- 5

HBV 487 RR

243 0021.303	-1289	$-0^d.004$
0307.297	- 625	+ .008
0366.294	- 488	.000
0517.468	- 137	- .001
0576.474	0	.000
0591.534	+ 35	- .014
0639.385	+ 146	+ .029
0698.354	+ 283	- .007
0704.389	+ 297	- .002
1028.262	+1049	- .012
1030.433	+1054	+ .005
1031.294	+1056	+ .005
1033.439	+1061	- .003

Table 5

Normal Points of Mean Light Curves

HBV 479

0.038	13^{m}.44	4
.082	12.67	5
.139	12.65	10
.213	12.59	10
.294	12.60	10
.373	12.62	10
.422	12.67	7
.454	12.69	6
.498	12.84	4
.549	12.68	8
.593	12.64	10
.663	12.62	10
.745	12.60	10
.795	12.62	10
.841	12.62	10
.876	12.64	8
.907	12.69	6
.960	13.45	4
.998	14.22	4
0.676	11.44	10
.734	11.43	10
.781	11.41	10
.818	11.45	10
.867	11.46	10
.908	11.50	10
.949	11.71	7
.977	12.30	5
.999	12.61	1

HBV 480

0.000	12.57	3
.031	12.47	6
.090	12.21	10
.183	12.17	10
.294	12.16	10
.378	12.17	10
.453	12.19	7
.511	12.20	9
.554	12.19	10
.613	12.17	10
.660	12.16	10
.711	12.13	10
.770	12.16	10
.833	12.17	10
.900	12.22	9
.973	12.49	6

HBV 482

0.016	12.36	2
.039	11.90	4
.097	11.49	10
.197	11.48	10
.318	11.51	10
.379	11.52	8
.423	11.53	7
.462	11.58	5
.501	11.69	2
.523	11.55	5
.573	11.52	8
.625	11.47	10

HBV 484

0.002	15.02	3
.013	14.81	5
.098	13.69	10
.161	13.69	10
.220	13.68	10
.264	13.66	10
.318	13.66	10
.391	13.67	10
.453	13.74	10
.511	13.79	10
.603	13.77	10
.652	13.66	10
.738	13.67	10
.807	13.68	10
.871	13.68	7
.910	13.88	5
.955	14.48	5

HBV 487 (C)

0.018	15.08	4
.089	15.22	5
.166	15.43	5
.225	15.52	5
.283	15.56	5
.383	15.72	5
.499	15.81	5
.522	15.80	5
.575	15.91	4
.606	15.91	5
.741	15.94	5
.840	15.95	5
.895	15.71	5
.935	15.62	5
.962	15.14	4
.991	15.00	4
.999	14.98	3

HBV 488

0.000	15.81	8
.028	15.81	9
.070	14.97	6
.116	14.70	10
.231	14.72	10
.320	14.70	10
.429	14.68	10
.487	14.72	10
.587	14.75	10
.645	14.70	10
.691	14.69	9
.748	14.73	8
.811	14.76	9
.884	14.71	10
.925	15.06	6
.980	15.81	3
0.849	14.86	10
.920	14.88	7
.954	15.11	5
.976	15.44	4
.999	15.81	4

HBV 492

0.000	16.08	3
.013	15.86	4
.041	15.52	5
.081	15.35	10
.154	15.37	10
.246	15.36	10
.305	15.37	10
.393	15.35	10
.512	15.36	10
.667	15.35	10
.739	15.37	10
.788	15.34	10
.835	15.36	10
.884	15.35	7
.969	15.69	4
.990	16.00	4

HBV 493

0.025	15.50	4
.047	15.03	5
.086	14.85	7
.136	14.88	10
.181	14.84	10
.260	14.86	10
.353	14.87	10
.427	14.85	10
.464	14.86	8
.506	14.89	5
.554	14.84	10
.621	14.84	10
.723	14.84	10

HBV 495

0.028	14.05	5
.084	13.84	5
.175	13.87	15
.265	13.87	15
.439	13.87	15
.513	13.86	15
.576	13.88	15
.661	13.91	12
.775	13.86	12
.904	13.89	10
.958	14.04	8
.976	14.13	5
.998	14.19	5

Notes on Individual Variables:

HBV

479 CSV 5274 = 94.1934

480 May also be classified as EA.

481 Heights of maxima vary between $13^{m}.7$ and $14^{m}.4$.

482 CSV 5373 = SVS 976. Maxima I and II different ($11^{m}.48$ and $11^{m}.41$).

483 A typical RCB variable. From long lasting nearly constant maximum brightness of about $13^{m}.7$ the star faints within some 10 days to $15^{m}.8$ immediately followed by a slower rise (about 30^{d}) to normal light. Observed Minima: 242 9407,9614 and 243 2057.

484 CSV 5400 = SVS 681. Min I and II a bit asymmetric, the last one displaced to longer phases ($0^{P}.55$).

485 Mira type. Only one maximum well observed. The variable is the western component of a double star.

486 BD + $61^{o}2146$ ($9^{m}.0$). A long-wave variation is superposed by a sort of 50 days fluctuations of smaller amplitude.

487 A typical RRa, b variable.

488 The minimum light of this EA variable could not be observed.

489 Certainly an eclipsing star (EA). Only 3 faintings observed:

242 9607.337	$12^{m}.38$	
243 0633.378	12.63	n.P = $64^{d}.853$
0698.231	12.10	

490 As shown by some night runs this star certainly is of the RR type with a period of about $0^{d}.5$ $\pm$. It was not possible to derive the true period from this material due to its scarcity.
Observed Maxima:

243 0873.475	243 1029.230:
0992.350	1061.220:
1026.370	1076.250

491 CSV 102116 = 25.1919 Cep. Very red irregular star of spectral type N. It shows slow variations between

$12^{m}_{.}5$ and $13^{m}_{.}3$. According to BD and AGK3 a close double.

492 An EA variable. Difficult to measure as situated near the north edge of the plates and due to its faintness.

493 It looks like there is a secondary minimum of only $0^{m}_{.}05$.

494 In minimum light this Mira variable is fainter than $16^{m}_{.}3$.

495 An EA type variable of relatively small amplitude ($0^{m}_{.}33$). No secondary minimum observed.

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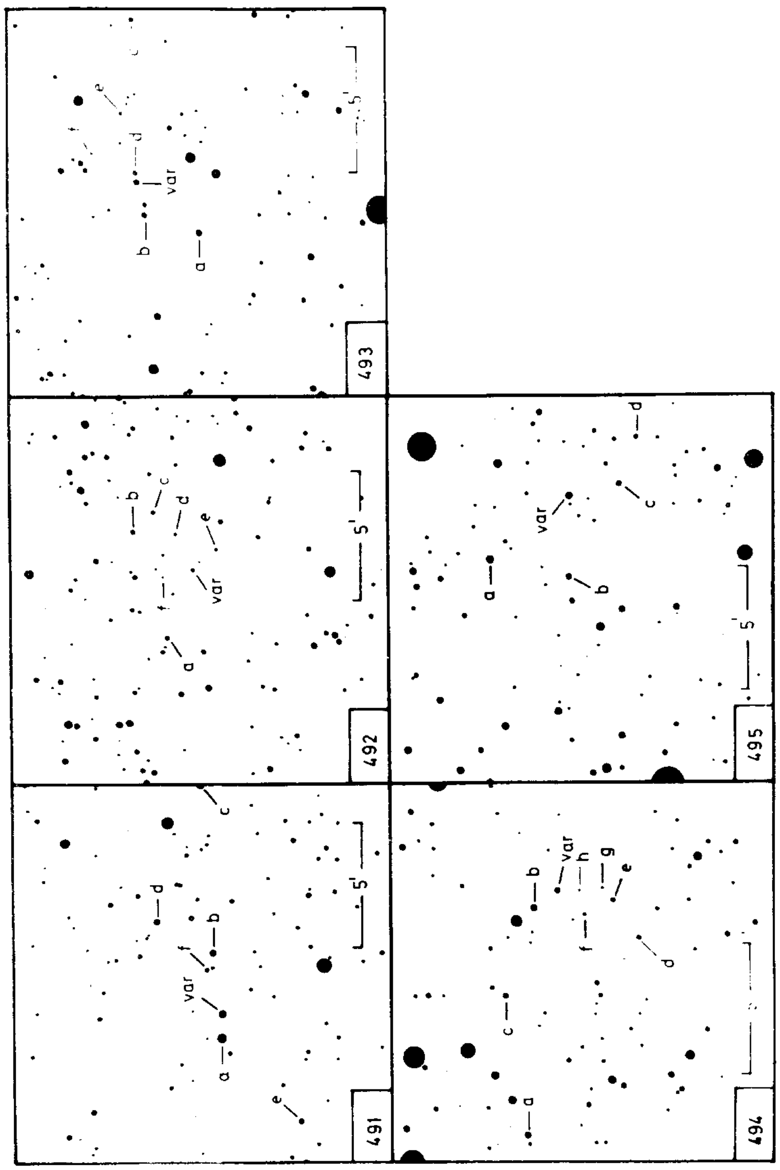
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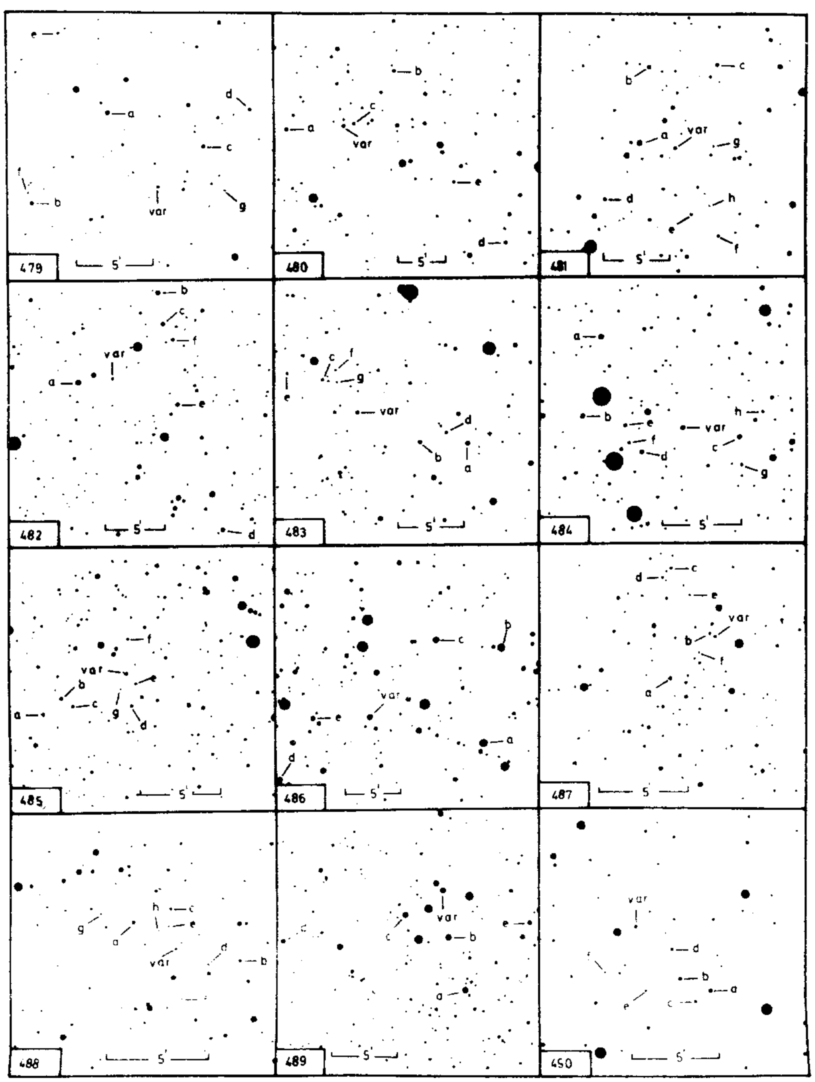
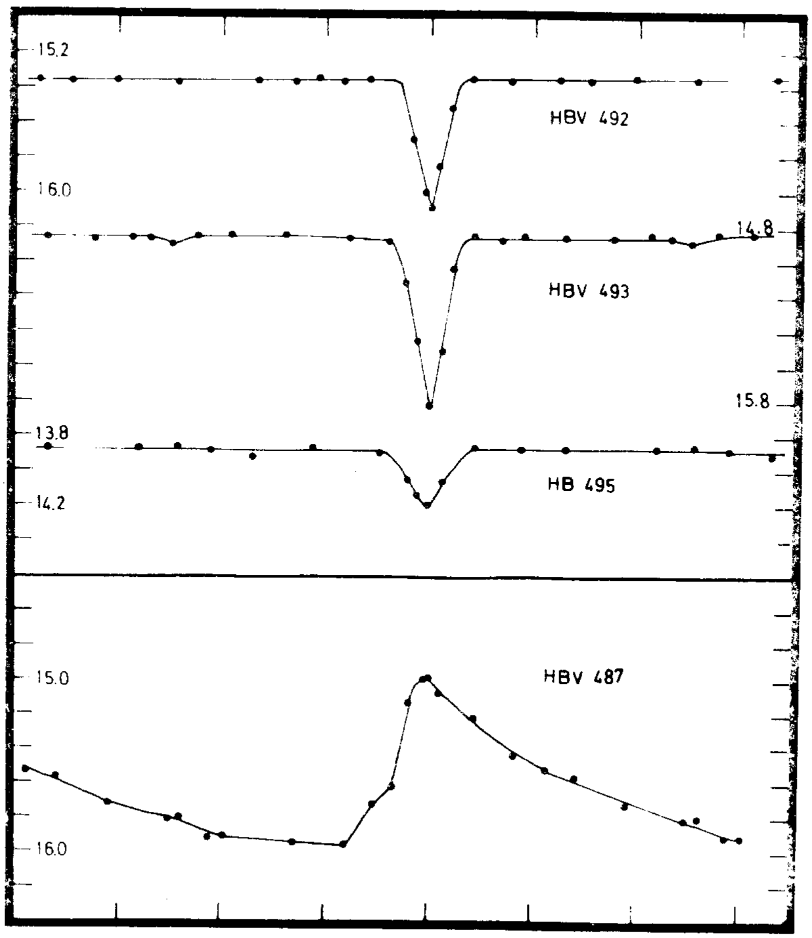
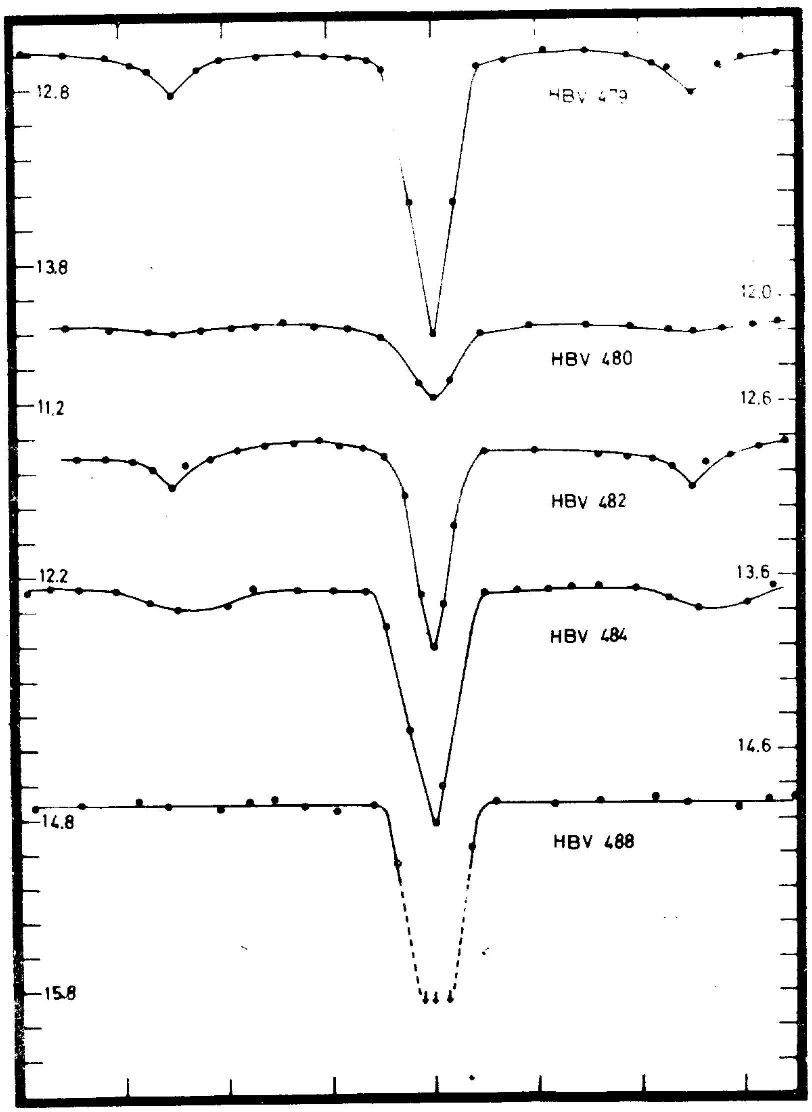
492
495
491
494




15.2
16.0
HBV 492
14.8
HBV 493
15.8
13.8
14.2
HB 495
HBV 487
15.0
16.0



12.8
HBV 479
13.8
12.0
HBV 480
11.2
12.6
HBV 482
12.2
13.6
HBV 484
14.6
14.8
HBV 488
15.8

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Konkoly Observatory
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1972 December 30

PHOTOELECTRIC SURVEILLANCE OF THE FLARE STARS YZ CMi, AD Leo AND EV Lac

The results of the photoelectric patrolling of the dMe flare stars YZ CMi, AD Leo and EV Lac on a total of 28 nights, through a standard B filter, on a 56-cm reflector equipped with an unrefrigerated 1P21 photomultiplier, are herein reported. Tables Ia, Ib and Ic give details of the coverage of the stars.

Four flares were recorded on the stars observed. Details of the flares, are given in Table II.

The light curves of the flares show that while the flare of YZ CMi is reminiscent of a Type I flare in Oskanyan's classification (Oskanyan, 1969), those of AD Leo and EV Lac resemble his Type II.

On a few nights the observations were taken by Messers T.R. Bhatt and T.C. Tewari, to whom our thanks are due.

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S.D. SINVHAL

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TABLE Ia

COVERAGE OF YZ CMi

(Times are rounded to the next minute of U.T.)

Date, 1972				
9 Feb.	17^h15^m-18^m,	17^h21^m-33^m,	17^h35^m-18^h31^m.	
18 Feb.	17 04 -24 ,	17 15 -27 ,		
21 Feb.	17 35 -47 ,	17 51 -18 13,	18 14 -19 ,	18 22 -41,
	18 43 -51 ,	18 53 -56 ,	19 12 -32 ,	19 35 -43.
14 Mar.	15 06 -29 ,	15 33 -38 ,	15 42 -58 ,	15 59 -16 41,
	16 44 -17 02,	17 11 -15 ,	17 18 -22 ,	17 25 -44,
	17 46 -18 09,	18 20 -31 ,	18 34 -19 04.	
16 Mar.	15 02 -23 ,	15 24 -16 09,	16 11 -15 ,	16 18 -23,
	16 30 -52 ,	16 53 -17 18,	17 27 -18 03,	18 06 -23,
	18 39 -19 05,			
17 Mar.	15 03 -16 16,	16 18 -23 ,	16 29 -17 18,	17 26 -18 04,
	18 06 -27 ,	18 39 -19 06,		
18 Mar.	14 46 -53 ,	14 55 -15 37,	15 42 -16 10,	16 17 -17 04.
22 Mar.	14 14 -39 ,	14 40 -15 24,	15 26 -59 ,	16 02 -30,
	16 35 -45 ,	16 59 -17 41,	17 43 -18 28.	
3 Apr.	15 13 -15 ,	15 19 -25 ,	15 28 -43 ,	15 44 -16 22,
	16 28 -17 02,	17 12 -19 ,	17 20 -22 ,	17 25 -29,
	17 36 -39 .			
7 Apr.	14 46 -15 38,	15 39 -50 ,	15 52 -16 18,	16 23 -46,
	16 48 -17 07,	17 08 -30 .		
6 May	14 57 -15 31,	15 37 -43 .		

(Total Coverage : 24^h30^m spread over 11 nights)

TABLE Ib

COVERAGE OF AD Leo

(Times are rounded to the next minute of U.T.)

Date, 1972				
11 Apr.	17^h39^m-18^h24^m,	18^h25^m-34^m,	18^h36^m-19^h08^m,	19^h10^m-20^h23^m.
12 Apr.	16 12 -17,	16 29 -45,	16 47 -17 01,	17 05 -12,
	17 17 -53,	17 56 -18 07,	18 10 -23,	18 25 -38,
	18 39 -59,	19 00 -05,	19 07 -18,	19 20 -38,
	19 39 -20 08,	20 10 -21.		
14 Apr.	18 38 -42,	18 44 -49,	18 51 -19 08,	19 10 -16,
	19 28 -40,	19 41 -46,	19 47 -20 04,	20 05 -24,
	20 25 -40.			
3 May	14 46 -52,	14 54 -15 20,	15 24 -35,	15 38 -16 20,
	16 24 -48,	16 51 -17 20,	17 31 -18 00,	18 06 -26,
	18 31 -49.			
6 May	16 13 -33.			
7 May	15 37 -56,	16 01 -08,	16 12 -36,	16 42 -17 12,
	17 13 -35,	17 38 -56,	18 00 -12,	18 14 -28,
	18 31 -35.			
8 May	15 14 -16 29,	16 32 -34,	16 45 -57,	17 04 -07,
	17 14 -55,	17 57 -18 18,	18 26 -48.	
9 May	16 17 -23,	16 30 -36,	16 38 -17 18,	17 23 -39,
	17 52 -18 21,	18 27 -19 09,	19 13 -31.	
10 May	15 37 -39,	16 24 -28,	16 32 -49,	16 52 -17 29,
	17 33 -46,	17 58 -18 08,	18 09 -25,	18 26 -44,
	18 46 -56,	18 58 -19 15.		
12 May	14 42 -44,	14 46 -15 03,	15 04 -21,	15 23 -36.
15 May	15 21 -30,	15 39 -43,	15 45 -51,	15 53 -16 02,
	16 04 -21,	16 26 -30.		
16 May	15 15 -38,	15 40 -45,	16 50 -17 20,	17 22 -36,
	17 39 -46,	17 48 -18 09.		

(Total Coverage : 25^h10^m spread over 12 nights)

TABLE Ic

COVERAGE OF EV Lac

Times rounded to the next minute of U.T.

Date			
27 Oct. 1971	$16^{h}29^{m}-31^{m}$,	$16^{h}43^{m}-53^{m}$,	$16^{h}55^{m}-17^{h}13^{m}$,
	17 16 -33 ,	17 35 -47 ,	17 49 -59 ,
	18 01 -14 ,	18 18 -28 ,	18 30 -19 03,
	19 06 -15 ,	19 16 -18 ,	19 19 -38 ,
	19 45 -49 ,	19 50 -52 .	
2 Nov. 1972	16 10 -19 ,	16 20 -40 ,	16 41 -17 16,
	17 17 -18 03,	18 05 -19 02,	19 03 -19 41.
6 Nov. 1972	16 44 -17 12,	17 16 -27 ,	17 29 -48 ,
	17 52 -18 43,	18 59 -19 30.	
8 Nov. 1972	15 26 -16 30,	16 31 -18 54.	
13 Nov. 1972	15 43 -16 2[illegible],	16 24 -16 51,	17 11 -18 55.

Total Coverage : $14^{h}33^{m}$ spread over 5 nights

FIG. 1

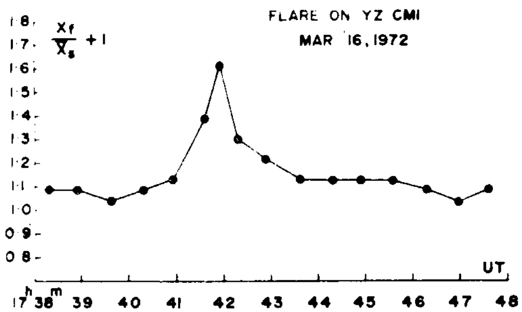


FIG. 2

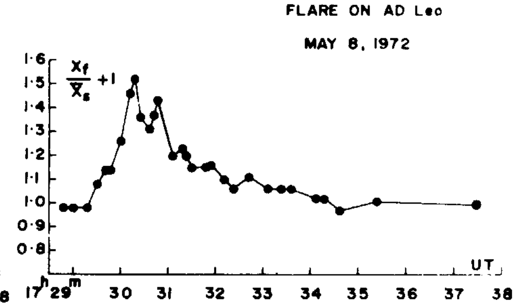


FIG. 3

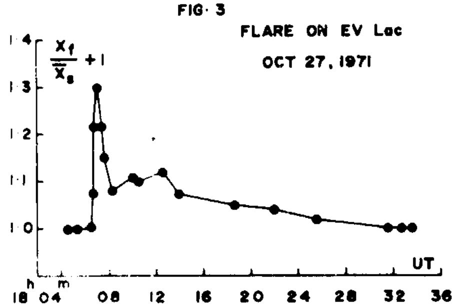


FIG. 4

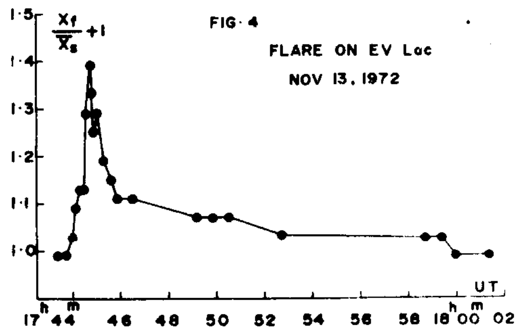


TABLE II

CHARACTERISTICS OF THE FLARES ON YZ CMi, AD Leo AND EV Lac[x]

Star	Magnitude and colour (Erro, 1971)	Date	UT_{max}	Flare duration Before max t_b	Flare duration After max t_a	$\frac{X_{fm}}{\bar{X}s}$	Δm_B	$\frac{\sigma}{\bar{X}s}$	P min	F (z)	Energy released at flare max. (10^{29} ergs/sec)	Excess energy liberated during the event (10^{30} ergs)
YZ CMi	$V=+11^{m}.20$ $B-V=+1^{m}.61$	16 March 1972	$17^h41^m54^s$	$1^{m}.6$	$4^{m}.4$	0.61	0.52	0.006	0.67	1.51	1.75	4.37
AD Leo	$V=+9^{m}.43$ $B-V=+1^{m}.54$	8 May 1972	$17^h30^m18^s$	$1^{m}.0$	$4^{m}.3$	0.52	0.46	0.004	0.90	2.19	7.02	24.81
EV Lac	$V=+10^{m}.09$	27 Oct. 1971	$18^h07^m09^s$	$1^{m}.8$	$24^{m}.6$	0.30	0.26	0.022	1.41	1.28	1.02	6.80
	$B-V=+1^{m}.36$	13 Nov. 1972	$17^h44^m37^s$	$0^{m}.9$	$15^{m}.4$	0.32	0.36	0.005	1.19	1.42	1.12	5.74

[x] Based on notation proposed by Oskanyan (1970).

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 751

Konkoly Observatory
Budapest
1972 December 30

LIGHT VARIATIONS OF 59 PISCIUM

The bright star 59 Psc (HR 214; $m(V)=6^m.01$),reported as a suspected Delta Scuti variable by Michael A. Seeds and Gail A. Yanchak (The Delta Scuti Stars, the Franklin Institute 1972) has been observed in V filter on the nights of October 11 and November 28, 1972, employing 61 Psc (HR 217; $m(V)= 6.45$) as comparison star. The light curves are shown in the figure. The curves show a period of very nearly $0^d.1040$ and light amplitude of $0^m.04$ ($\pm 0^m.01$). The following maxima and minima have been observed:

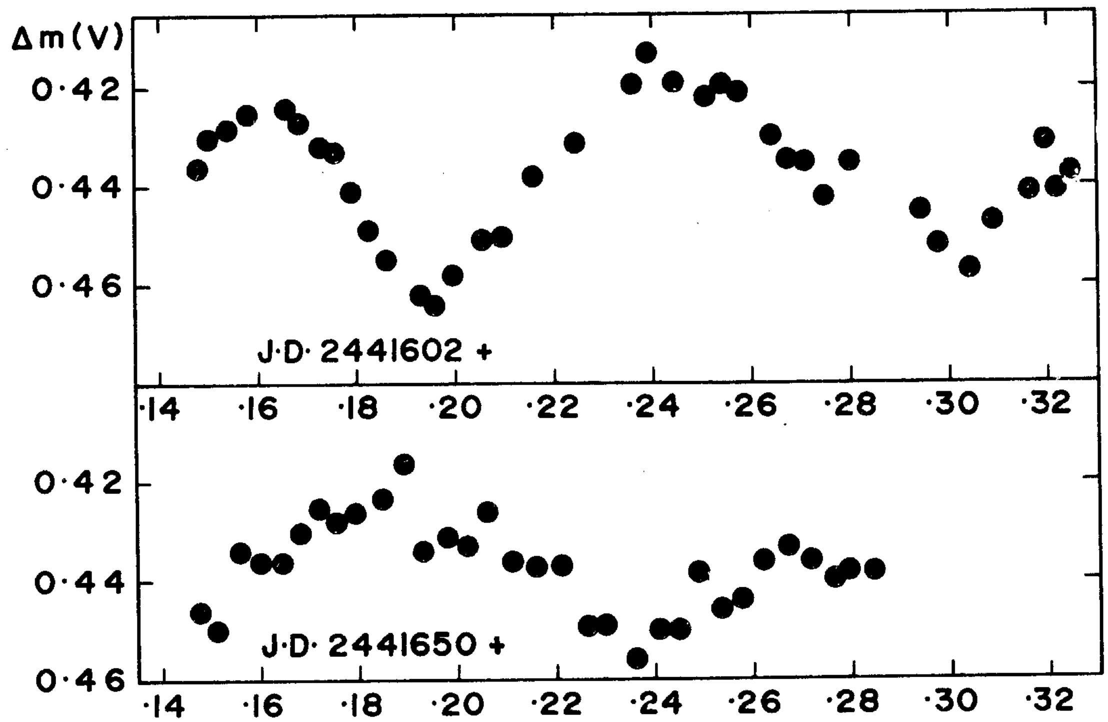
Maxima:	Minima:
J.D.2441602.241	J.D. 2441602.193
J.D.2441650.185	J.D. 2441650.236

The varying amplitudes of the two light curves suggest the presence of beating. Further investigations are proceeding.

Thanks are due to Dr. S.D. Sinvhal for helpful discussions.

Uttar Pradesh State Observatory
Naini Tal, India

S.K. GUPTA
A.K. BHATNAGAR



Light curves of 59 Psc through V filter. The ordinates m V are the differential instrumental magnitudes in the sense comparison star minus variables.

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 752

Konkoly Observatory
Budapest
1972 December 31

12 NEW VARIABLE STARS IN NGC 6402

A recently determined color-magnitude diagram for NGC 6402 (M14) (1) showed a number of stars which were not known to be variable and which fell in the variable star gap. Using 11 plates taken with the 61-inch at Flagstaff in 1967 by Dr. Serge Demers as well as 5 plates taken with the Mt. Wilson 100-inch by Dr.H. Arp in 1952, the authors checked these stars for variability. In this way 11 new variables have been found. In addition, another was found by chance.

In the table below, the coordinates x and y were measured using the system of reference originally used by Helen Sawyer (2). The B magnitudes were determined using standards given in Demers and Wehlau (3).

Var.No.	x	y	max	min
77	-110	+55	17.55	18.10
78	-137	-5	17.50	18.50
79	-12	-18	17.40	18.50
80	-35	-145	17.50	18.45
81	-38	-138	17.65	18.10
82	-79	-122	17.65	18.20
83	-65	-34	17.70	18.50
84	-44	-38	17.80	18.60
85	-21	+48	17.65	18.25
86	+64	+22	17.85	18.75
87	-74	+11	17.60	18.60
88	-78	+10	17.55	18.55

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University of Western Ontario

(1) Smith, C. 1973, unpublished M.Sc. thesis, University of Western Ontario.
(2) Sawyer, H.B. 1938, Pub.Dom.Ap.O. 7, 121.
(3) Demers, S. and Wehlau, A. 1971,Astron.J. 76, 916.

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 753

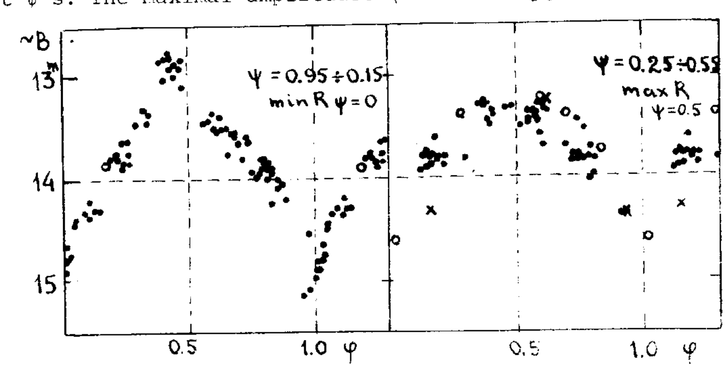
Konkoly Observatory
Budapest
1973 January 5

THE VARIATIONS OF THE LIGHT CURVE OF HZ HERCULIS IN THE 35-DAY CYCLE

The features of the light curve of HZ Her at different phases of the 35^d variation in X-ray emission were investigated. 318 plates (1907-1972) of the Sternberg Institute and photoelectric observations of Lyutiy et al. (1972) were used. According to H. Gursky (1972) X-ray maxima were observed on JD 2441330.2 and JD 2441400.8. It was found that the bright optical maxima were usually observed at the middle and at the beginning of the 35^d cycle. Using the X-ray observations and the brightest optical maxima the following elements of the 35^d cycle were obtained:

$$\text{Min X-ray} = 2441347.86 + 35^{d}.396 \cdot E$$

The phases ψ of the 35^d cycle were then calculated and the light curves with $P=1^{d}.70017$ for different intervals of ψ were constructed. These light curves are essentially different for different ψ's. The maximal amplitudes ($12^{m}.8-15^{m}.1$ pg) are observed at



$\psi=0.95-0.15$ (left part of the Fig.) as well as in the middle of the 35^d cycle at $\psi=0.55-0.65$ ($12^{m}.8-15^{m}.$[illegible] pg). At the phases $\psi=0.25-0.55$ the light curve becomes more flat, its minimum is more broad and the range is $13^{m}.2-14^{m}.6$ pg (right part of the Fig.). There are probably more narrow phase intervals where the amplitude is still smaller.

Therefore the X-ray maximum (ψ=0.5) coincides with the minimal light amplitude i.e. minimal reflecting effect as it was suggested by Cherepashchuk et al. (1972) and Lyutiy et al. (1972).

There are also humps on the light curves moving systematically with ψ. The detailed data are to be published in "Variable Stars" Vol.18, No.5 (1973).

I am grateful to Yu.N.Efremov, B.V.Kukarkin, B.V.Komberg and R.A.Sunyaev for helpful discussion.

Moscow, December 1972.

N. KUROCHKIN

References:

Cherepashchuk A.M., Efremov Yu.N., Kurochkin N.E., Shakura N.I., Sunyaev R.A., 1972, IBVS No. 720.

Gursky H., 1972, Preprint.

Kurochkin N.E., 1972, Astr.Circ. USSR, No.717.

Lyutiy V.M., Sunyaev R.A., Cherepashchuk A.M., 1972, Preprint.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1973 January 5

ON TWO UNSTUDIED VARIABLE STARS IN ANDROMEDA
FI And = S 9498 and FM And S 9504

Hoffmeister is the discoverer of S 9498 and S 9504 (Astr. Nachr. Bd. 289.205). RR Lyrae-type was suspected (13^m-14^m ph and 14^m-$14,5^m$ ph).

On 125 and respectively 108 plates taken with the 40 cm astrograph of Sonneberg Observatory I examined these variable stars and obtained the following elements:

FI And Max.=J.D. 2438239.520 + $0\overset{d}{.}564815$. E
RRab ; M-m = $0\overset{P}{.}12$

Observed maxima:

J.D. 243...	E	O-C
8239.520	0	$0\overset{d}{.}000$
8407.264	297	- 6
8671.595	765	- 8
8708.318	830	+ 2
9027.437	1395	0

FM And Max.=J.D. 2438641.456 + $0\overset{d}{.}69551$. E
RRab ; M-m = $0\overset{P}{.}16$

Observed maxima:

J.D. 24....	E	O-C
38641.456	0	$0\overset{d}{.}000$
643.519	3	- 24
671.370	43	+ 7
673.484	46	+ 35
680.385	56	- 20
708.235	96	+ 10
39025.340	552	- 38
055.316	595	+ 32
349.506	1018	+ 21
379.420	1061	+ 28
765.396	1616	- 4
40859.449	3189	+ 12
866.356	3199	- 36
914.394	3268	+ 11
41215.493	3701	- 46

Further particulars will be published in "Mitteilungen der Bruno-H.-Bürgel-Sternwarte Hartha" Heft 5.

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V 384 Cas

V 384 Cas = BV 298 was discovered by Strohmeier, Knigge, in 1960 ($11^m.8-12^m.5$ ph; Veröff. Sternwarte Bamberg V.5).

Satanova, E.A. observed 3 minima and gave the first elements (Astr.Circ. 216, 1960):

Min.= J.D. 2436083.467 + $5^d.595$.E (EA)

On 249 sky patrol plates of Sonneberg Observatory I examined the light variations (J.D. 2435391-40205) and obtained the new elements:

Min.=J.D.2436073.516+$1^d.108273$ .E (EA)

Observed minima:

J.D. 24...	E	O - C	Observer
36073.516	0	$0^d.000$	Busch, H.
083.479	9	- 11	Satanova, E.A.
114.527	37	+ 5	Busch, H.
542.283	423	- 32	Satanova, E.A.
603.293	478	+ 23	Busch, H.
790.540	647	- 29	"
810.514	665	- 4	"
840.447	692	+ 6	"
37577.466	1357	+ 22	"
935.446	1680	+ 31	"
38243.549	1958	+ 35	"
642.506	2318	+ 13	"
39389.439	2992	- 30	"
500.285	3092	- 11	"
531.307	3120	- 21	"
40187.424	3712	- 1	"

Particulars will be published in "Mitteilungen der Bruno-H.-Bürgel-Sternwarte Hartha" Heft 5.

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 755

Konkoly Observatory
Budapest
1973 January 5

MU Cas

MU Cas = BD + $59^{\circ}22$ = S 4672 was discovered by Hoffmeister in 1949.

First elements were found by Wenzel (Veröff.Sternwarte Sonneberg 2.5.354.1956):

Min. = J.D. 2427962.509 + $3^{d}.861145$. E
(E); 10^{m} - $10^{m}.3$ ph)

Further observations by Romano (Osservat.Ptivato Specola "Ariel" No.17.32.1959),Zonn and Semeniuk (Acta Astron. 9.3.158. 1959) confirm Wenzel's elements.

Lange, (Astr.Circ.542.1969) observed the star (1969 Aug.29) and recognized ultrashort light variations (RRs).

Max. = J.D. 2440464.305 + $0^{d}.0624312$, E

So I evaluated 64 short-exposed plates (Exposure 8 min.) obtained in 4 nights at our observatory. No ultrashort light variations were found.

Further, I examined 114 sky patrol plates of our observatory and 152 plates of Schwerin Observatory.

I also confirm the elements published by Wenzel and the Beta-Lyrae-type.

Observed minima:

J.D. 24...	E	O - C	
37082.438	+2362	$-0^{d}.089$	
39026.561	2865,5	- 65	Min.II
028.429	2866	- 127	
057.422	2873,5	- 93	Min.II
059.409	2874	- 39	
061.335	2874,5	- 43	Min.II
088.259	2881,5	- 145	Min.II
146.260	2896,5	- 55	Min.II
387.563	2959	- 80	
389.476	2959,5	- 97	Min.II
40924.285	3357	- 93	

Particulars will be published in "Mitteilungen der Bruno-H.-Bürgel-Sternwarte Hartha" Heft 5.

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UY Mon

The GCVS 1970 contains the following elements for this variable stars:

Min. = J.D. 2427660.593 + $1\overset{d}{.}261246$. E (E)

It was my intention to verify these elements. Different periods were published before.

291 sky patrol plates of Sonneberg Observatory were examined. I found 4 Min. I and 8 Min. II.

The observations confirm the above mentioned elements.

Improved elements:

Min.= J.D. 2438411.508 + $1\overset{d}{.}261253$. E (EB)

($9\overset{m}{.}6$ - $10\overset{m}{.}0$/ $9\overset{m}{.}9$ ph

Observed minima:

J.D. 24...	E	O - C	
27660.593	- 8524	+$0\overset{d}{.}006$	GCVS 1970
35924.341	- 1972	+ 24	
37317.426	- 867,5	+ 55	
37561.374	- 674	- 49	Ahnert, P.
37696.377	- 567	- 1	
38003.512	- 323,5	+ 9	
38411.508	0	+ 0	
38413.453	+ 1,5	+ 53	
38466.403	+ 43,5	+ 30	
38471.383	+ 47,5	- 35	
39056.610	+ 511,5	- 29	
39200.388	+ 625,5	- 34	
39533.413	+ 889,5	+ 20	
40859.574	+ 1941	- 26	

Comparison stars and a minimum in "Mitt.Veränd.Sterne Bd. 2.62 by Ahnert, P.

The light-curve will be published in "Mitteilungen der Bruno-H.-Bürgel-Sternwarte Hartha" Heft 5.

H. BUSCH
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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 756

Konkoly Observatory
Budapest
1973 January 17

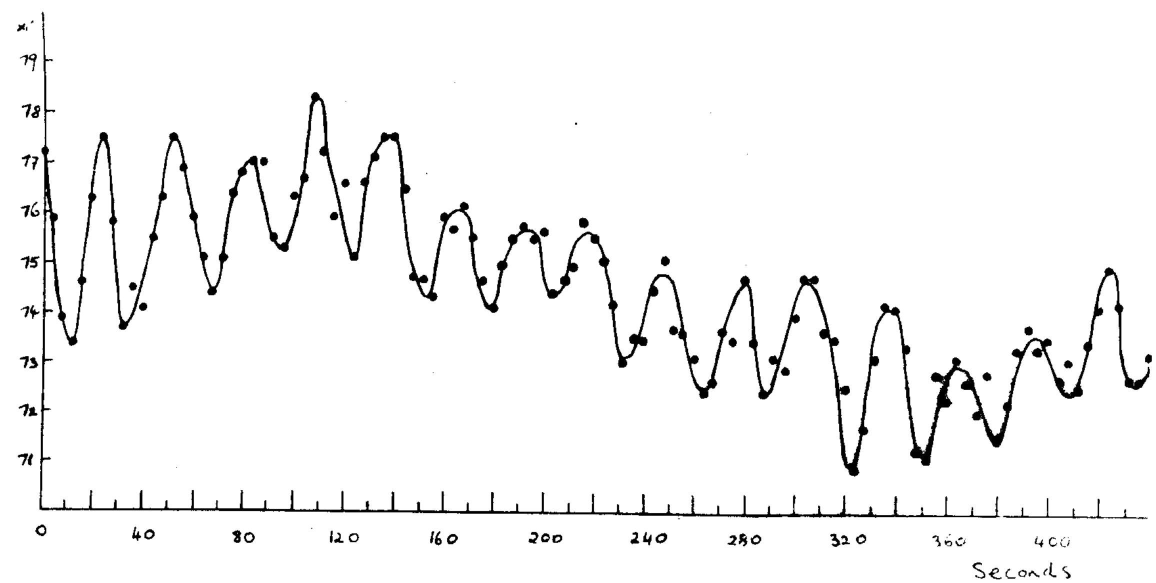
28-SECOND OSCILLATIONS IN VW Hyi

The southern hemisphere dwarf nova VW Hyi underwent an outburst starting on December 10 and returned to normal light by December 28. A fairly detailed photometric coverage of this outburst has been obtained with the 40 inch reflector of the Sutherland Station of the South African Astronomical Observatory, using high speed photometric equipment similar to that described by Nather and Warner (M.N.R.A.S. 152, 209, 1971). During outbursts of the dwarf novae Z Cam,CN Ori and AH Her, Warner and Robinson (Nature 239, 2, 1972) found oscillations with periods near 17, 24 and 31 secs respectively. All the data collected during the recent outburst of VW Hyi will be subjected to a periodogram analysis to search for similar periodic oscillations, but we feel it may be of interest to other observers to announce that on 25th December,when VW Hyi was rapidly declining but was still about 2 magnitudes above normal (minimum) light, brightness variations having a period of 28.15 secs and a peak-to-peak amplitude of about 5 percent were clearly seen throughout a 4 hour observing run.The beginning of this run is illustrated in the accompanying light curve.

This is the first time that rapid oscillations in the light curve of a dwarf nova have been large enough to see without the aid of a periodogram analysis. The appearance of the light curve is very similar to that shown by the wellknown 71 sec oscillations in DQ Her.

Department of Astronomy,
University of Cape Town.

BRIAN WARNER
JOHN M. HARWOOD



Vertical scale is total number of counts per 4-sec integration.

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 757

Konkoly Observatory
Budapest
1973 January 18

PHOTOELECTRIC OBSERVATIONS OF 31 CYGNI IN THE 1972 ECLIPSE

On thirty-two nights between April and August of 1972,UBV photoelectric observations of 31 Cyg were carried out by Sato and Hayasaka at the Akita University with the 25 cm reflector (UBV), by Ogata at the Kanagawa Education Centre with the 20 cm refractor (BV), and by Kitamura at the Okayama Astrophysical Observatory with the 91 cm reflector (UBV). These cooperative observations were made to collaborate with the international campaign on 31 Cyg in the 1972 eclipse which was decided by the Commission 42 of IAU with Dr.K.O. Wright as coordinator.

The observations of 31 Cyg were made differentially with respect to 26 Cyg as the comparison star, and standard stars of Johnson were also observed on each night to make it possible to reduce the individual observations to the standard UBV system. Description of the photoelectric equipment used was already made elsewhere (e.g. Tokyo Astr.Bull.Sec.Series No.221, 1972).

Table 1
UBV Photoelectric Observations of 31 Cyg.

Date (UT) 1972		JD (Hel)	ΔU	ΔB	ΔV	Observatory*
Apr.	10	244 1418.1938	$-1^{m}.676$	$-1^{m}.096$	$-1^{m}.258$	A
		.2034	-1.704	-1.093	-1.255	A
	12	420.2786	-	-1.104	-1.282	K
	14	422.3042	-	-1.075	-1.284	K
	17	425.2633	-	-1.113	-1.274	K
	27	435.2776	-	-1.091	-1.269	K
	29	437.2579	-	-1.105	-1.269	K
May	1	439.2726	-	-0.821	-1.207	K
	2	440.2477	-	-0.742	-1.183	K
	6	444.2461	-	-0.719	-1.196	K
	7	445.1465	-0.037	-0.698	-1.184	A
		.1504	-0.002	-0.662	-1.156	A
	9	447.1881	-0.047	-0.693	-1.165	A
		.1964	-0.072	-0.702	-1.162	A
	10	448.1287	-0.017	-0.668	-1.148	A
		.1370	-0.024	-0.678	-1.139	A
	11	449.2719	-	-0.712	-1.178	K
	14	462.2524	-	-0.690	-1.169	K
	18	466.2040	-	-0.696	-1.174	K
	31	469.1411	-0.018	-0.676	-1.158	A
		.1494	-0.026	-0.683	-1.143	A
Jun.	1	470.1913	-	-0.715	-1.189	K
	2	471.0974	-0.035	-0.692	-1.135	A
		.1058	-0.019	-0.681	-1.152	A
	5	474.0697	-0.020	-0.678	-1.162	A
	6	475.0961	+0.002	-0.678	-1.168	A
		.1045	+0.003	-0.679	-1.192	A
		.1887	-	-0.708	-1.184	K

Table 1. (continued)

Date (UT)		JD (Hel)	ΔU	ΔB	ΔV	Observatory*
1972						
Jun.	10	244 1479.1026	$-0^m.016$	$-0^m.682$	$-1^m.156$	A
		.1109	-0.016	-0.679	-1.162	A
		.1186	-0.034	-0.687	-1.171	A
		.1739	-	-0.715	-1.201	K
	18	487.1173	-	-0.708	-1.203	K
	23	492.0731	-0.012	-0.689	-1.176	A
		.0802	-0.036	-0.675	-1.167	A
	25	494.0567	-0.042	-0.691	-1.152	A
		.0646	-0.022	-0.694	-1.158	A
	26	497.0899	-	-0.710	-1.196	K
	27	498.0945	-	-0.697	-1.192	K
	28	499.0741	-	-0.715	-1.172	K
Jul.	1	500.0917	-0.054	-0.738	-1.173	O
		.0955	-	-0.777	-1.207	K
		.1140	-0.064	-0.743	-1.179	O
		.1244	-0.084	-0.762	-1.198	O
		.1313	-0.086	-0.767	-1.204	O
		.1397	-0.096	-0.759	-1.201	O
		.1473	-0.085	-0.766	-1.196	O
		.1931	-0.098	-0.775	-1.203	O
	3	502.0716	-1.162	-0.974	-1.258	A
		.0819	-1.238	-0.997	-1.243	A
	7	506.0789	-	-1.047	-1.269	K
	20	519.0325	-	-1.083	-1.271	K
Aug.	4	533.9956	-	-1.055	-1.284	K

*Observatories: A=Akita, K=Kanagawa, O=Okayama.

Table 2.

Depths of the Minimum in UBV.

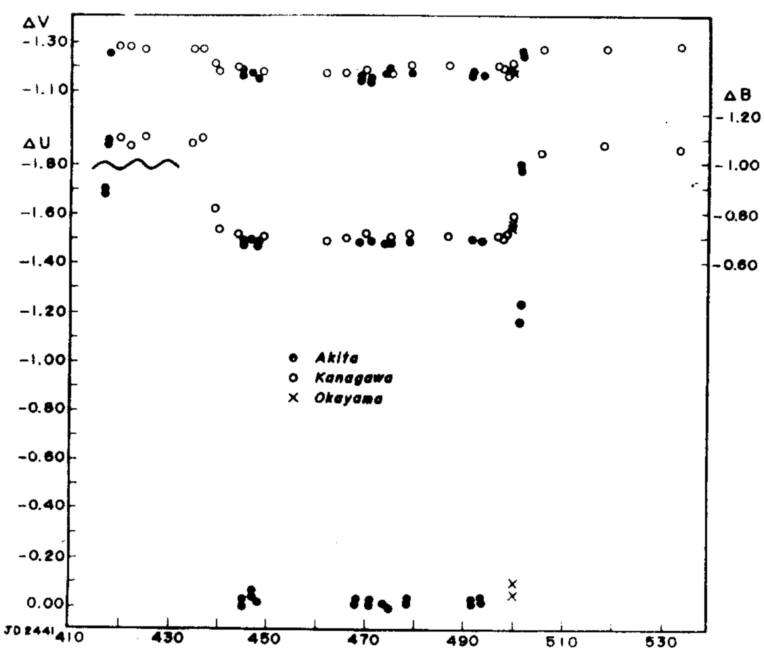
	ΔU	ΔB	ΔV
Outside eclipse	$-1^m.690$ (2) ±9 (p.e.)	$-1^m.088$ (7) ±5	$-1^m.273$ (7) ±3
Within totality	-0.025 (20) ±3	-0.690 (28) ±2	-1.168 (28) ±2
Depth	1.665	0.398	0.105

Numbers in ( ) give the number of observations used.

All the results expressed in the magnitude-differences $m_{31\ Cyg}-m_{26\ Cyg}$ in the UBV system are given in Table 1, where the notations have usual meanings and each Kanagawa value of ΔB, ΔV is the mean of several observations. The resultant observations are also plotted in the figure. A systematic difference of the order of $0^m.02 \sim 0^m.03$ in B and $\bar{V}$ remains between the Akita and Kanagawa observations. From the average values of ΔU, ΔB, ΔV outside eclipse and within totality, the corresponding depths on the light curve are deduced as shown in

Table 2. From our light curve, the epoch of mid-eclipse can be estimated to be JD 2441469.5 and the duration of totality to be about 57 days.

We are thankful to Dr.K.O. Wright (Dominion Observatory) and Dr.K. Gyldenkerne (Copenhagen Observatory) for their useful information on this campaign.



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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 758

Konkoly Observatory
Budapest
1973 January 25

FLARES OF YZ CMi

The star YZ CMi (dM4.5e) was observed photoelectrically on a total of eight nights in the period Oct.-Dec.1972 and the record of the effective coverage appears in Table I, during which three flares were detected.

The details of the characteristics of the flares and the disc areas involved in the flare events are given in Table II. The techniques and the procedures adopted are the same as employed earlier by us (Kapoor and Sinvhal, 1973).

The flares have light curves (Figs.1-3) more or less analogous to the Type II flares of Oskanyan (1969).

The author thanks Dr.S.D. Sinvhal for his valuable comments and guidance.

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References:
Kapoor, R.C. and Sinvhal, S.D.: 1973, I.B.V.S.(submitted).
Oskanyan, V.S.: 1969, Non-periodic Phenomena in Variable Stars (Ed.L.Detre, Academic Press, Budapest), 131.

TABLE I

EFFECTIVE COVERAGE OF YZ CMi

(Times are rounded to the nearest minute of U.T.)

Date 1972			
30 Oct.	$19^h11^m-34^m$,	$19^h35^m-58^m$,	$20^h00^m-28^m$;
	20 30 -32 ,	20 34 -43 ,	20 44 -21 11;
	21 12 -14 ,	21 16 -44 ,	21 15 -22 17;
	22 20 -46 ,	22 47 -23 09,	23 10 -47.
2 Nov.	19 53 -20 09,	20 17 -27 ,	20 32 -21 00;
	21 02 -59 ,	22 00 -47 ,	22 50 -23 38.
6 Nov.	19 38 -20 00,	20 05 -17 ,	20 25 -41 ;
	20 52 -21 14,	21 34 -46 ,	21 48 -22 04;
	22 06 -13 ,	23 25 -44 .	
8 Nov.	19 00 -22 ,	19 28 -40 ,	20 01 -06;
	20 07 -13 ,	20 24 -43 ,	22 08 -26.
13 Nov.	19 07 -17 ,	20 07 -16 ,	21 50 -22 43;
	22 46 -23 50.		
4 Dec.	17 55 -58 ,	18 01 -24 ,	18 37 -44;
	18 46 -50 ,	18 53 -19 06,	19 07 -14;
	19 22 -49 ,	19 58 -20 20,	20 22 -50;
	20 52 -21 01,	21 25 -37 ,	21 46 -51;
	21 52 -57 ,	22 40 -46 ,	23 01 -16;
	23 22 -41.		
6 Dec.	17 14 -47 ,	17 49 -18 04,	18 06 -13;
	18 15 -19 ,	18 20 -26 ,	18 42 -19 25.
11 Dec.	16 08 -09 ,	16 11 -22 ,	16 24 -17 45;
	17 57 -19 31,	19 37 -20 53,	20 55 -23 48.

(Total Coverage: 26^h26^m spread over 8 nights)

TABLE II

CHARACTERISTICS OF THE FLARES ON YZ CMi

(dM4.5e; V=+11.20; B-V=+1.61)

Date 1972	UT_{max}	Flare Duration before max. t_b	after max. t_a	$\frac{X_{fm+s}}{\bar{X}_s}$	Δm_B	$\frac{\sigma}{\bar{X}_S}$	P_{min}	F_z	Energy released at flare max 10^{29} erg/sec	Excess emission during the event 10^{30} ergs
6 Nov.	$20^h33^m48^s$	2.30^m	3.80^m	1.98	0.74	0.027	1.41	1.47	2.15	9.20
4 Dec.	18 14 32	0.55	3.75	1.75	0.61	0.060	0.66	1.66	1.91	4.30
11 Dec.	23 30 53	0.70	12.90	1.90	0.70	0.017	2.49	1.37	2.07	16.24

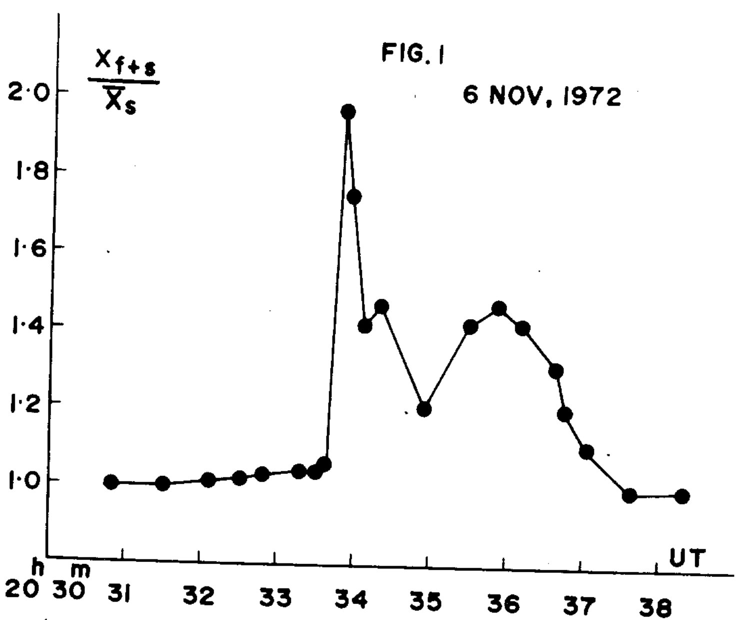


FIG. 1
6 NOV, 1972

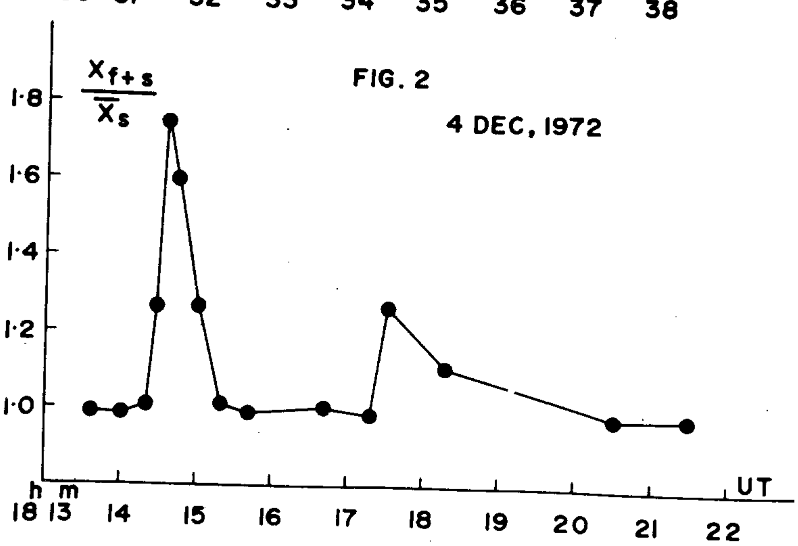
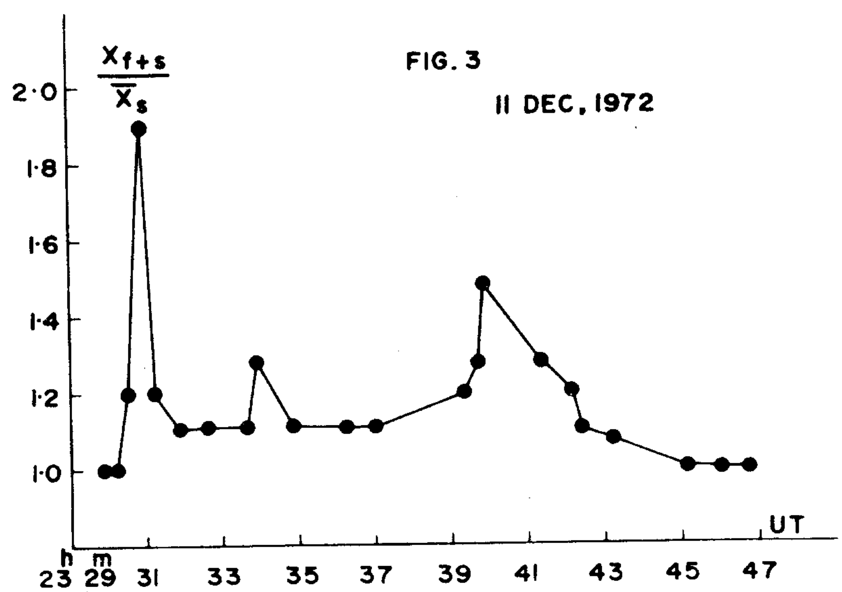


FIG. 2
4 DEC, 1972



$\frac{X_{f+s}}{\overline{X}_s}$
11 DEC, 1972
2·0
1·8
1·6
1·4
1·2
1·0
UT
h m
23 29
31
33
35
37
39
41
43
45
47

FIG. 3

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 759

Konkoly Observatory
Budapest
1973 January 23

PHOTOELECTRIC OBSERVATIONS OF EV LAC DURING THE 1972, SEPTEMBER 1-15 INTERNATIONAL PATROL

According to the observing schedule of cooperative observations proposed by the IAU Working Group on flare stars (P.F. Chugainov 1971, IBVS No. 605), EV Lac was patrolled at the Catania Astrophysical Observatory for about 17.5 hours. The observations were carried out with a 61 cm universal type reflector feeding a synchronous u, b, v photometer.

The detailed coverage intervals are given in Table 1. Three flares have been observed and their characteristics are reported in Table 2. The light curves of the observed flares in U, B, V are shown in figures 1, 2 and 3.

The explanation of symbols and details both on the observing equipment and on the Catania photometric system can be found on Cristaldi S. and Rodonò M., Astron. and Astrophys. Suppl. 10, 1973.

M. Consoli, C. Lo Presti, F. Spinella have collaborated to the present work.

Catania Astrophysical Observatory
December 29, 1972

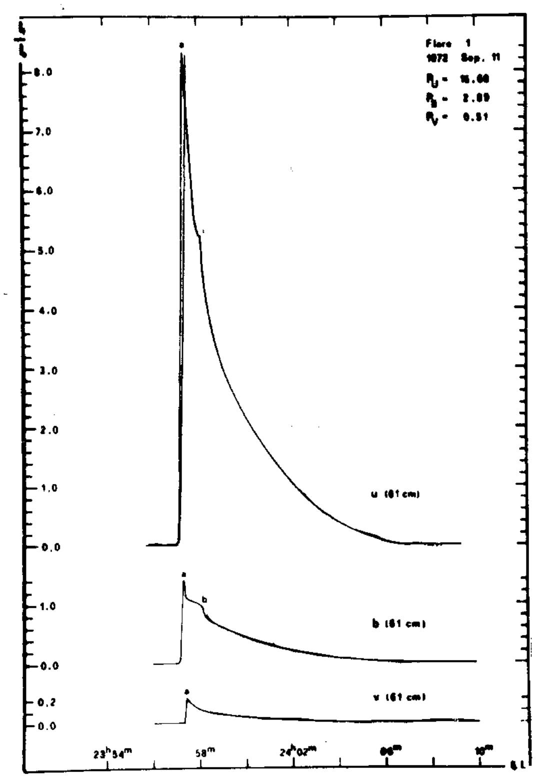
S. CRISTALDI
M. RODONÒ

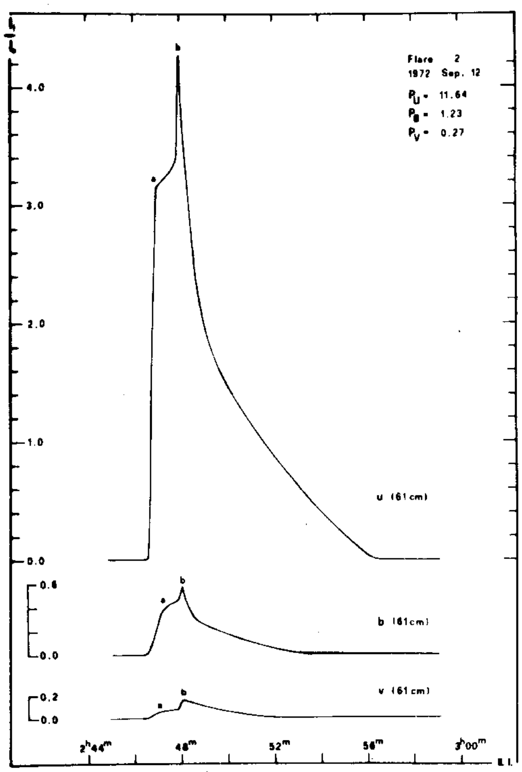
Table 1

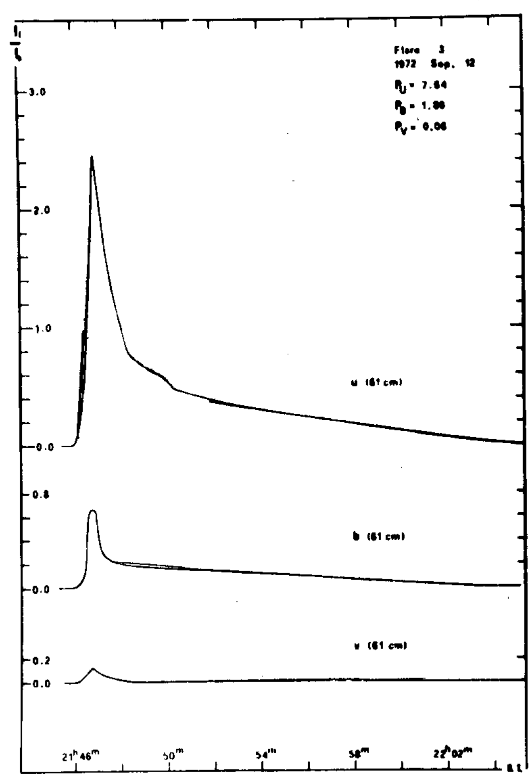
Date 1972	Tel.	Light	Coverage (U.T.)	Total coverage	$\overline{3\sigma/I_o}$
1 Sep.	61	u,b,v	0000-0006; 0105-0143.	139	.16/.05/.03
3 "	61	u,b,v	2349-2400; 0000-0037; 0040-0302.	190	.16/.04/.03
9 "	61	u,b,v	2030-2050; 2052-2117; 2142-2215; 2218-2230; 2231-2254; 2255-2400; 0000-0007; 0010-0015; 0017-0103; 0142-0236; 0243-0259.	296	.17/.04/.03
10 "	61	u,b,v	2028-2057; 2124-2139; 2145-2229; 2230-2327; 0124-0226.	209	.19/.04/.03
12 "	61	u,b,v	1925-1950; 1952-2056; 2110-2132; 2141-2258; 2300-2337; 2339-2400; 0000-0003; 0008-0036.	217	.20/.07/.04

Table 2

no.	Tel.	Light	t_{max} U.T. 1972 Sep.	JD 244157.	d_b	d_a	$3\sigma/I_{or}$	$\left(\frac{I_f}{I_o}\right)_{max}$	Energy P	Energy erg	Air mass	f	sky
1	61	U	11.235740		0.3	9.2	0.37	9.25	15.60	4.90×10^{31}		0	
		B	235730	2.5020	0.2	9.3	0.09	1.38	2.89	6.35×10^{31}	0.86	0	1
		V	235740		0.1	5.9	0.04	0.41	0.51	2.52×10^{31}		0	
2	61	U	12.024760		0.6	15.9	0.39	2.35	11.64	3.68×10^{31}		0	
		B	024790	2.6205	0.2	3.9	0.09	0.54	1.23	2.71×10^{31}	1.27	0	1
		V	024810		1.0	1.7	0.05	0.12	0.27	1.36×10^{31}		0	
3	61	U	12.214690		1.0	8.6	0.56	3.51	7.64	2.41×10^{31}		0	
		B	214650	3.4113	1.3	4.0	0.12	0.56	1.80	3.97×10^{31}	0.82	0	1
		V	214660		1.5	0.6	0.05	0.15	0.06	0.29×10^{31}		0	


Flare 1
1972 Sep. 11
u (61 cm)
b (61 cm)
v (61 cm)
23h54m
58m
24h02m
06m
10m


Flare 2
1972 Sep. 12
P_U = 11.64
P_B = 1.23
P_V = 0.27
u (61 cm)
b (61 cm)
v (61 cm)
2h44m
48m
52m
56m
3h00m


Flare 3
1972 Sep. 12
P_U = 7.64
P_V = 0.06
u (61 cm)
b (61 cm)
v (61 cm)
21h46m
50m
54m
58m
22h02m

COMMISSION 27 OF THE I. A. U.
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NUMBER 760

Konkoly Observatory
Budapest
1973 January 23

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR UV CETI DURING THE 1972 OCTOBER 1-15 INTERNATIONAL PATROL.

The preliminary results of UV Cet photoelectric observations carried out at the Catania Astrophysical Observatory during the period proposed by the IAU Working Group on flare stars (P.F. Chugainov 1971, IBVS No.605) are given. The observations were made in b light with a 91 cm cassegrain reflector feeding a classical one channel photometer.

The patrol intervals in U.T. are given in Table 1.During the 8.0 hours of patrol time 8 flares were observed, their characteristics are given in Table 2.

The light curves of the observed flares in the B color are shown in Figures 1, 2 and 3.

The explanation of symbols and details both on observing equipment and on the Catania photometric system can be found in Cristaldi S. and Rodonò M., Astron. and Astrophys. Suppl. 10,1973.

R. Barbagallo, M. Consoli, C.Lo Presti have collaborated to the present work.

Catania Astrophysical Observatory
December 29, 1972

S. CRISTALDI and M. RODONÒ

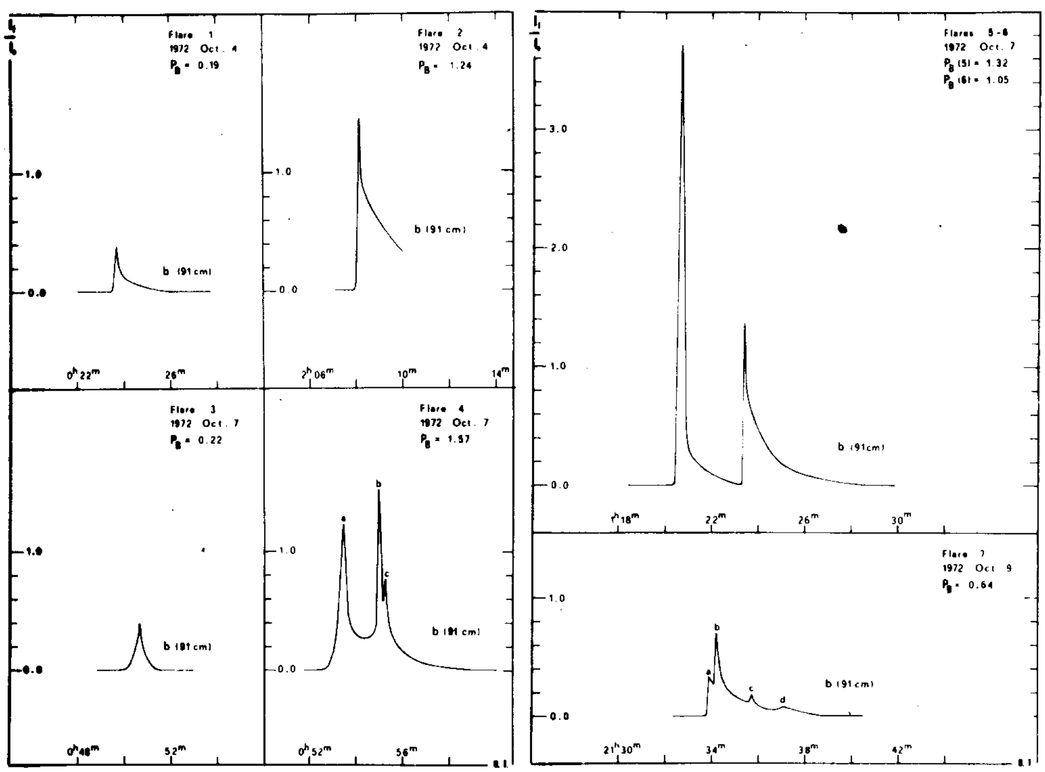
Table 1

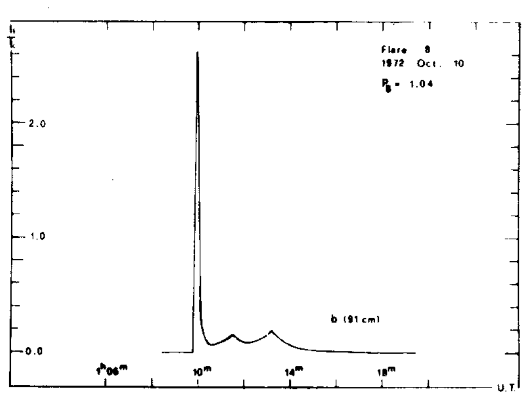
Date 1972	Tel.	Light	Coverage U.T.	Total coverage	$\overline{3\sigma/I_o}$
Oct. 4	91	b	0018-0029; 0051-0101; 0102-0111; 0122-0155; 0159-0210; 0219-0230; 0249-0258; 0308-0324.	120^m	0.05
Oct. 7	91	b	0039-0204.	085	0.07
Oct.9-10	91	b	2058-2105; 2107-2116; 2117-2140; 2148-2229; 2231-2256; 2300-2321; 2322-2333; 2338-2347; 2350-2400; 0000-0027; 0030-0130; 0133-0147; 0154-0205; 0212-0222.	278	0.05

Table 2

no.	t_{max} U.T. October	J.D. 2441...	d_b	d_a	$3\sigma/I_{or}$	$\frac{I_f}{I_o}$max	$\frac{Energy}{P}$	erg	Air mass	f	sk
1/72	4.002350	594.5215	$0^m.15$	$2^m.30$	0.12	0.39	0.19	8.54×10^{28}	1.49	1	2
2/72	4.020815	594.5941	0.10	1.80	0.12	1.43	1.24	54.28×10^{28}	1.96	5	2
3/72	7.005065	597.5403	0.45	2.00	0.16	0.38	0.22	9.46×10^{28}	1.58	0	1
4/72b	7.005500	597.5433	0.14	4.00	0.16	1.51	1.57	68.87×10^{28}	1.60	3	1
5/72	7.012070	597.5612	0.30	2.60	0.16	3.71	1.32	57.65×10^{28}	1.71	0	2
6/72	7.012340	597.5631	0.10	5.00	0.16	1.36	1.05	45.97×10^{28}	1.73	0	2
7/72b	9.213420	600.4039	0.25	4.50	0.14	0.69	0.44	19.35×10^{28}	1.72	3	2
8/72a	10.010995	600.5537	0.15	7.25	0.14	2.62	1.04	45.48×10^{28}	1.72	3	2

Telescope: 91 cm, blue filter.


Flare 1
1972 Oct. 4
P_B = 0.19
b (91 cm)
Flare 2
1972 Oct. 4
P_B = 1.24
b (91 cm)
Flare 3
1972 Oct. 7
P_B = 0.22
b (91 cm)
Flare 4
1972 Oct. 7
P_B = 1.57
b (91 cm)
Flares 5-6
1972 Oct. 7
P_B (5) = 1.32
P_B (6) = 1.05
b (91 cm)
Flare 7
1972 Oct 9
P_B = 0.64
b (91 cm)
U.T.


Flare 8
1972 Oct. 10
P_B = 1.04
b (91 cm)
U.T.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 761

Konkoly Observatory
Budapest
1973 January 23

NEED OF PLANNED OBSERVATIONS OF MAGNETIC STARS

To evaluate the reliability of each class of models invoked to interpret the behaviour of magnetic stars, the variation curves of magnetic field intensity, radial velocity and brightness are needed (Blanco et al. 1972).

At present about 400 stars are considered magnetic or suspected magnetic. Among these, Zeeman measurements are available for 128 stars. These stars are listed in Table I if, at least for a Zeeman measurement, the probable error is less than one third of the measure itself, otherwise they are listed in Table II. In both tables the types of available observations, for which periodic curves do exist, are indicated as follows:

H = magnetic field intensity curves
V_r= radial velocity curves
l = photometric curves
W_λ= spectral line intensity curves

An asterisk in the l column denotes the stars being photoelectrically observed at the Catania Observatory.

From Table I it is evident that only for a few stars magnetic field intensity, radial velocity and brightness curves are available; furthermore the various kinds of observations have been carried out at very different epochs. In the present conditions any attempt to evaluate the reliability of the available models seems to be extremely precarious.

The need of an international planning in the field of magnetic star observations (simultaneous magnetic field intensity and brightness observations) is evident.

Osservatorio Astrofisico
Catania - Italia
December 30, 1972

C. BLANCO, F.A. CATALANO,
G. GODOLI and S. VACCARI

Table I

	Star	other designations	Sp	Available periodic curves
1	HD 2453		A1p	*
2	4174	EG And	gM2ep	l
3	8441		A2p	H V_r l
4	9996	HR 465	A0p	H V_r l Wλ
5	10221	HR 478=43 Cas	A0p	
6	10783	UZ Psc	A2p	H V_r l
7	11187		A0p	
8	15144	HR 710	A4p	H V_r l
9	18296	HR 873=21 Per=LTPer	A0p	H V_r l Wλ
10	19445		A8p	
11	20210	HR 976	A6pm	V_r
12	22374	9 Tau	A1p	
13	22649	HR 1105	S5	
14	24712	HR 1217	A8p	H Wλ
15	25354		A0p	H V_r l
16	25823	HR1268=41 Tau=GS Tau	A0p	H V_r l
17	27962	HR1389=68 Tau	A2IVm	
18	30466		A0p	V_r l
19	32633	HZ Aur	B9p	H V_r l
20	33254	HR 1672=16h Ori	A2-F2m	V_r
21	33904	HR 1702=5μ Lep	B9p	
22	42474	WY Gem	M3ep(+B3)	
23	42616		A2p	
24	49976	HR 2534	A0p	
25	50169		A4p	
26	53791	HR 2671=R Gem	S3e	l
27	62140	HR 2977=49 Cam	gF0p	
28	63700	HR 3045=7 ξ Pup	G0I-G3Ib	
29	64486	HR 3082	A0p	
30	65339	HR 3109=53 Cam=AX Cam	A3p	H V_r l
31	71866	TZ Lyn	A0p	H l
32	72968	HR 3398=3 Hya	A2pm	H l*
33	74521	HR 3465=49 Cnc	A1p	H V_r l
34	77350	HR 3595=69νCnc	B9p	
35	78316	HR 3623=76K Cnc	B8p	H V_r l
36	81009	HR 3724	A2	V_r
37	89822	HR 4072	A0p	V_r *
38	90569	HR 4101=45 Leo	A1p	
39	98088	HR 4369	A9p	H V_r *
40	108662	HR 4752=17 Com=AI Com	A0p	H V_r l
41	110066	HR 4816	A3p	
42	110073	HR 4817=1 Cen	B8p	
43	110380-79	HR 4826=29 γ^1Vir	F0V	
44	111133	HR 4854	A2p	H V_r l Wλ
45	112413	HR 4915=12α^2CVn	A0p	H V_r l Wλ

Table I (cont.)

	Star	other designations	S_p	Available periodic curves
46	HD 115708		A2p	
47	118022	HR 5105=78 Vir=CW Vir	A2p	H V_r l
48	125248	HR 5355=CS Vir	A1p	H V_r l Wλ
49	126515		A2p	H *
50	129174	HR 5475=29 π^1Boo	B9p	Wλ
51	130559	HR 5523=7μ Lib	A1p	
52	133029	HR 5597	A0p	H
53	134793		A3p	*
54	135297		A0p	
55	137909	HR 5747=3βCrB	A9p	H V_r l
56	137949	33 ζ^2Lib	F0p	H *
57	143807	HR 5971=14ιCrB	A0p	
58	149911	HR 6179	A0p	*
59	152107	HR 6254=52 Her	A3p	
60	153286		A2-Fpm	
61	153882	HR 6326=V451 Her	A3p	H V_r l
62	165474	HR 6758	A6p+A0	
63	171586		A2p	
64	173524	HR 7049=46 Dra	A0	V_r
65	173650	HR 7058=V535 Her	A0p	H V_r l
66	174933	HR 7113=112 Her	B9II-III	H V_r
67	176232	HR 7167=10 Aql	A4p	H V_r l
68	179761	HR 7287=21 Aql	B8p	l
69	182989	RR Lyr	A3-F1	H V_r l
70	184552	HR 7431 51h^1 Sgr	A3-F5m	V_r
71	187474	HR 7552	A0p	H
72	188041	HR 7575	A6p	H V_r l
73	191742		A6p	
74	192913		A0p	
75	196502	HR 7879=73 Dra=AF Dra	A2p	H V_r l Wλ
76	201601	HR 8097=5γ Equ	A9p	H V_r l
77	203006	HR 8151=θ^1Mic	A2p	l
78	204075	HR 8204=34ζCap	G4-5p	
79	207757	AG Peg	WN6+M1-3II-III	
80	208816	HR 8383= VV Cep	M2Iaep+B9p	V_r l
81	215038	GQ Cep	A0p	l
82	215441	GL Lac	A0p	H V_r l
83	216386	HR 8698=73λAqr	M2III	
84	221507	HR 8937=β Scl	B9p	
85	224801	HR 9080=CG And	A0p	l

Table II

	Star	other designations	spectral type	available periodic curves		
1	HD 358A	HR 15=21 α And= δPeg	B9p	V_r	1	
2	4778	HR 234	A0p		1	
3	5797		A0			
4	12288		A0p			
5	18078		A0p			
6	20283	HR 979 B	A0p			
7	25267	HR 1240= 36 τ^9 Eri	A0p	V_r		
8	27376	HR 1347= 41 Eri	B8.5V	V_r		
9	29139	HR 1457= 87 α Tau	K5III		1	
10	34452	HR 1732= IQ Aur	B9p		1	W_λ
11	40312	HR 2095= 37 θ Aur	B9.5p			
12	43819	HR 2258	B9p			
13	45677		B2pe			
14	56495		A3pm			
15	60414,5	HR 2902= KQ Pup	M2Iabpe+Be			
16	62509	HR 2990= 78 β Gem	K0III			
17	68351	HR 3215= 15 Cnc= Ψ Gem	A0p		1	
18	84367	HR 3871= θ Ant	F7V			
19	89069		A0p			
20	96707	HR 4330	A5p			
21	107168	HR 4685= 8 Com	A6m			
22	108651	HR 4751= 17 Com B	A4m			
23	112185	HR 4905= 77 ε UMa	A0p	V_r	1	W_λ
24		BD+46°1913	Apm			
25	137389	HR 5731	A0p			
26	147550	HR 6096	B9p			
27	148898	HR 6153= 9 Oph	A7p			
28	151525	HR 6234= 45 l Her	A0p			
29	176155	HR 7165= FF Aql	F5-F9	V_r	1	
30	184905		A0p		1	
31	189849	HR 7653= 15 Vul	Am	V_r		
32	190073		A0ep			
33	192678		A3p		1	
34	194093	HR 7796= 37 γ Cyg	F8Ib			
35	335238	BD+29°4202	Ap			
36	204411	HR 8216	Ap			
37	207840	HR 8348	B6Vp			
38	208095	HR 8357B	A0p	V_r		
39	216533		A2p			
40	220825	HR 8911= 8 κ Psc	A2p		1	
41	221568	V 436 Cas	A0		1	
42	221760	HR 8949= ι Phe	A2p		1	
43	223640	HR 9031= 108 ι^3 Aqr	A0p		1	

References

Blanco, C., Catalano, F.A., Godoli, G., Vaccari, S. 1972, Ricerche sulle stelle magnetiche in Giornate di Studio dedicate al Prof. F. Zagar, Milano.

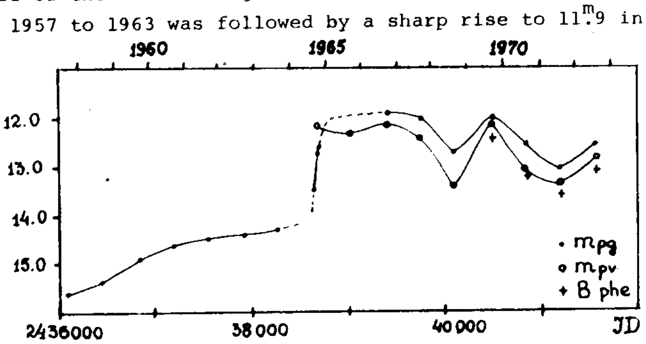
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 762

Konkoly Observatory
Budapest
1973 January 31

ON THE PHOTOMETRIC HISTORY OF V 1329 CYGNI = HBV 475

The photographic and photovisual light curves of V 1329 Cyg were derived from its magnitude estimates on about 600 plates of Odessa Observatory, taken in 1957-72. The photographic observations were made on ORWO ZU-1 plates with Zeiss objective, the photovisual ones on ORWO ZP-1 plates with C-18 filter. The B magnitudes of the comparison stars were adopted according to Kohoutek and Bossen (1), the V magnitudes were determined from the photoelectric observations obtained with the 60 cm reflector of the Sternberg Institute Crimean Station.

The results are given in the Figure. The observed slow increase of the star's brightness from $15^m.4$ to $14^m.2$ during the period 1957 to 1963 was followed by a sharp rise to $11^m.9$ in 1964.



During the maximum of brightness long-period variations with a range of 1 mag. were present, confirmed by photoelectric observations in 1969-72 (1-3). Our photoelectric observations of V 1329 Cyg in photometric system close to UBV are given in the following Table.

J.D. 2441...	n	V	B-V	U-B	J.D. 2441...	n	V	B-V	U-B
236.4	1	$13^m.04$	$+0^m.49$	$-0^m.62$	252.4	2	$12^m.96$	$+0^m.56$	$-0^m.60$
237.4	2	12.97	+0.56	-0.56	596.4	2	12.74	+0.22	-1.20
238.4	2	12.98	+0.55	-0.63	597.4	2	12.53	+0.48	-1.17
239.4	3	13.02	+0.54	-0.63	598.4	2	12.51	+0.48	-1.12
240.4	3	12.97	+0.55	-0.59	604.4	2	12.41	+0.50	-1.14
246.4	2	12.96	+0.59	-0.68	605.4	2	12.42	+0.50	-1.10
					618.4	2	12.80	+0.36	-0.99

V.P. ARHIPOVA
Sternberg State Astronomical Institute, Moscow

O.E. MANDEL
Odessa Astronomical Observatory

1 Kohoutek, L. and Bossen, H. 1970, ApLetters 6, 157.
2 Chartrand, M.R. and Steinon, F.M., BAAS 2, 186, 1970.
3 Bossen, H. 1972, IBVS No. 722.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 763

Konkoly Observatory
Budapest
1973 February 1

SY FORNACIS - NO U GEMINORUM STAR

By Dr.B. Warner my attention was drawn to SY For, which according to the data of the GCVS 1969 should be one of the brightest objects of U Gem type.

In reality,however,the object is most probably a semiregular reddish variable star of a cycle length of 50 to 60 days. This result was obtained by estimating some 130 patrol exposures of the Sonneberg collection, mostly of the seasons of 1936, 1937 and 1952/53. The light curve is wave shaped with an amplitude of roughly 1.5 mag.

Akademie der Wissenschaften der DDR
Zentralinstitut für Astrophysik
Sternwarte Sonneberg

W. WENZEL

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 764

Konkoly Observatory
Budapest
1973 February 6

DEVELOPMENT OF A NEW 4-YEAR CYCLE IN THE 41-DAY PERIOD OF RR LYRAE

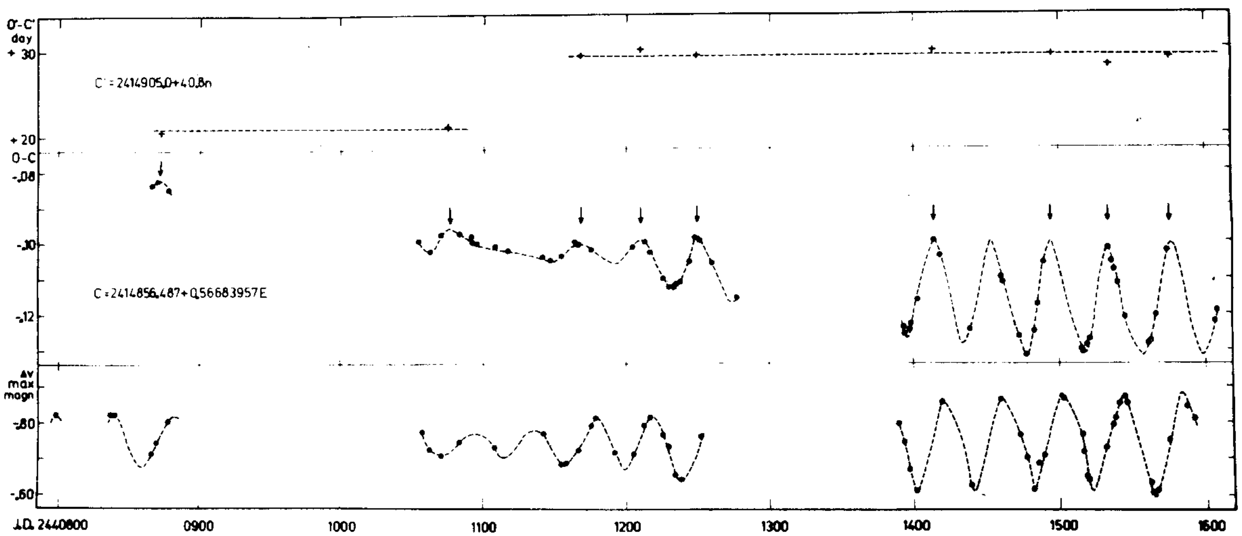
Long series of our photoelectric observations of RR Lyrae made a 4-year period in the variations connected with the 41-day cycle evident.(Detre,L., Szeidl,B., Proc.41 IAU Colloquium, Toronto 1972, in press) In the fall of 1970 and early 1971 the amplitude of the 41-day cycle became again very small indicating the near end of the last 4-year cycle.

In order to study the transition from the old cycle to the expected new one we observed the star photoelectrically in B, V at our 24-inch reflector every night in the past two years whenever it was possible (20 maxima and 28 rising branches in 1971 while 29 maxima and 30 rising branches in 1972).The results for the visual maxima and phase shifts of the median brightness are shown in the Figure. The phases are calculated by using the formulae given in Detre,L., 1970, Ann.d.Univ.-Sternwarte Wien, Bd.29.,Nr.2.,p.89. and shown in the Figure.

At the end of the 4-year cycle the phase variations during the 41-day cycle died almost completely down and then the new cycle started with a rapid increase of the amplitude of the phase oscillation. The amplitude of the maximum-variations was only $0^m.07$ at the end of the old cycle (June 1971) and then it became very rapidly as large as $0^m.16$ (October 1971). By the beginning of the 1972 observing period the amplitude of the maximum-variations had approached its maximum value and was nearly constant ($0^m.25$ in April and $0^m.28$ in October 1972).

The most interesting was the phase shift in the 41-day period.O-C' was about $+19^d$ during the whole old cycle till June 1971 while it has been $+29^d$ for the new one since July 1971. Consequently, the beginning of the new cycle was accompanied by an abrupt phase shift of 10 days, about the fourth of the 41-day period. During one and the same 4-year cycle the 41-day period remained constant.

L. DETRE and B. SZEIDL
Konkoly Observatory
Budapest



O-C
day
+ 30
C = 2414905,0+40,8n
+ 20
O-C
-,08
-,30
C = 2414856,487+0,56683957E
-,12
ΔV
max
magn
-,80
-,60
J.D. 2440800
0900
1000
1100
1200
1300
1400
1500
1600

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 765

Konkoly Observatory
Budapest
1973 February 7

Veröffentlichungen der Remeis-Sternwarte Bamberg
Astronomisches Institut der Universität Erlangen-Nürnberg
Band X, Nr. 105

NEW FAINT SOUTHERN VARIABLE STARS

On sky patrol plates, taken with the 10 inch Metcalf at the Boyden Observatory Bloemfontein, South Africa, further 30 stars were found to be variable.(22 new stars and 8 stars listed already in the Catalogue of Suspected Variable Stars, CSV).
The brightness of these stars are obtained from the Harvard-Groningen-Atlas, Selected Areas (edition 1965 by A.Brun and H.Vehrenberg).
Finder-Charts are 1° in declination, south is up.

BV-Nr.	RA 1900.0	Decl.	Max Brightness pg	Ampl. pg	Type	Remarks
BV 1521 Hyi	$03^h23^m30^s$	$-72^{\circ}27\farcm9$	$13\fm8$	$0\fm6$	RR	1
	=CSV 306 = HV 11932					
BV 1522 Men	04 05 02	-78 10.2	13.0	1.1	EA	2
BV 1523 Men	04 15 58	-79 41.9	13.5	0.6	L	3
BV 1524 Men	04 36 08	-74 41.4	13.7	0.5	EA	4
BV 1525 Men	04 46 27	-70 25.8	12.5	1.0	-	-
	=CSV 447 = HV 8036					
BV 1526 Men	= CAP $-70^{\circ}0325$ ($9\fm7$)		9.7	0.4	EA	5
BV 1527 Men	05 42 32	-79 45.2	13.9	0.6	L	6
BV 1528 Men	06 21 37	-79 38.4	13.6	0.5	EA	7
BV 1529 Vol	07 14 24	-71 36.9	13.1	0.5	EB?	8
BV 1530 Men	07 18 07	-79 34.6	13.2	0.7	EA	9
BV 1531 Men	07 38 50	-76 37.9	13.1	0.6	L	10
BV 1532 Vol	07 49 42	-71 36.0	12.2	3.3	?	-
	=CSV 1170 = HP 8098 = 108.1933					
BV 1533 Cha	08 09 03	-75 53.8	13.4	0.8	RR	11
BV 1534 Vol	08 13 39	-72 11.8	14.1	0.6	M	12
BV 1535 Cha	08 20 36	-75 27.3	13.2	0.9	L	13
BV 1536 Vol	08 44 21	-70 45.5	15.0	0.5	-	-
	= CSV 1370 = HV 8162					
BV 1537 Cha	08 54 31	-75 37.6	14.1	0.7	RR	14
BV 1538 Cha	10 04 50	-77 39.2	13.9	0.7	L	15
BV 1539 Cha	10 16 17	-79 25.2	13.5	0.6	L	16
BV 1540 Cha	10 31 27	-79 19.7	13.5	0.5	EB	17
	= CSV 6790 = S 6307					
BV 1541 Cha	10 35 51	-78 53.5	14.5	0.5	L	18
	= CSV 6793 = S 6310					
BV 1542 Car	10 36 53	-71 27.4	12.9	0.9	EA	19
BV 1543 Car	10 42 25	-71 32.3	12.5	2.5	N	20
BV 1544 Car	11 04 00	-72 41.4	13.0	1.0	?	21
	= CSV 6819 = S 6338					
BV 1545 Mus	11 15 54	-72 52.0	14.0	0.9	L	22
	= CSV 1729 = HV 8356 = 135,1934					
BV 1546 Mus	11 29 34	-69 59.5	14.2	0.6	L	23
BV 1547 Mus	11 56 46	-71 41.5	13.8	0.7	EA	24
BV 1548 Cha	12 36 58	-77 13.6	14.2	0.4	L	25
BV 1549 Mus	13 54 25	-64 20.2	11.3	0.2	L	26
BV 1550 TrA	= CAP $-64^{\circ}3218$		9.9	0.4	EA	27

Remarks:

1 few good maxima
2 few minima, not enough for a period
3 many maxima and minima, irregular type
4 many maxima, few minima, but not enough for a period
5 many maxima, few minima, not enough for a period
6 irregular type
7 many maxima, few minima, not enough for a period
8 many maxima and minima, short period ?
9 many maxima, few minima, not enough for a period
10 many maxima and minima, irregular type
11 few good maxima
12 probably an M-type variable
13 many maxima and minima, irregular type
14 few good maxima
15 many maxima and minima, irregular type
16 many maxima and minima, rather difficult
17 many maxima, short period
18 many maxima, but more minima, irregular type
19 many maxima, few minima, eclipsing binary, $P \sim 2^d$
20 probably a Nova. The results are given below

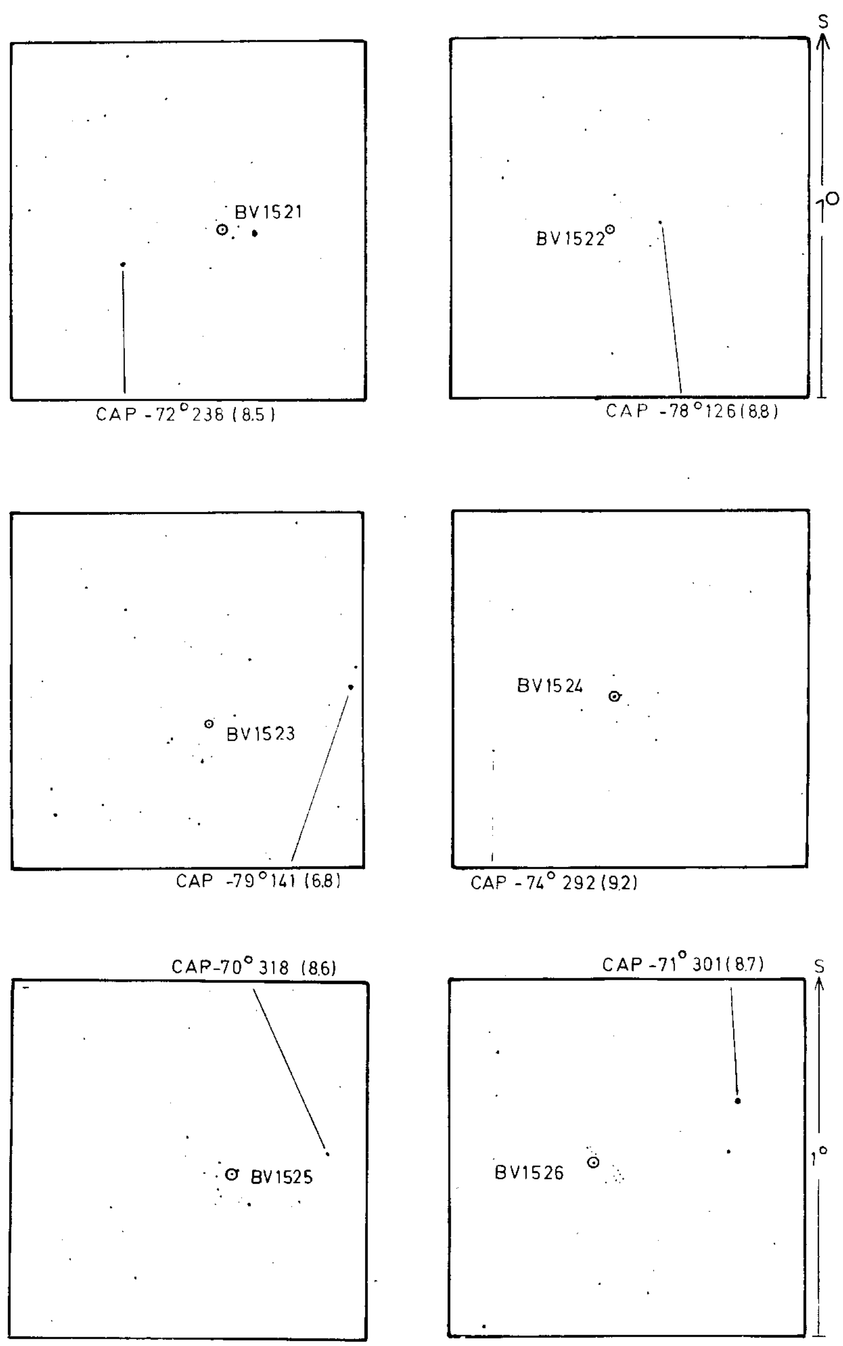
Date	Julian Date	Magnitude
1969 March 23	2440304.413	15.2
1970 Febr. 7	0625.514	12.4
Febr. 9	0627.483	12.2
Febr. 11	0629.503	12.4
Febr. 12	0630.094	12.6
Febr. 15	0633.096	13.2
March 1	0647.420	13.9
March 3	0649.034	14.2
March 29	0675.341	15.2
March 30	0676.346	15.2
April 3	0680.322	15.2

No values between March 23, 1969 and Febr. 7, 1970.

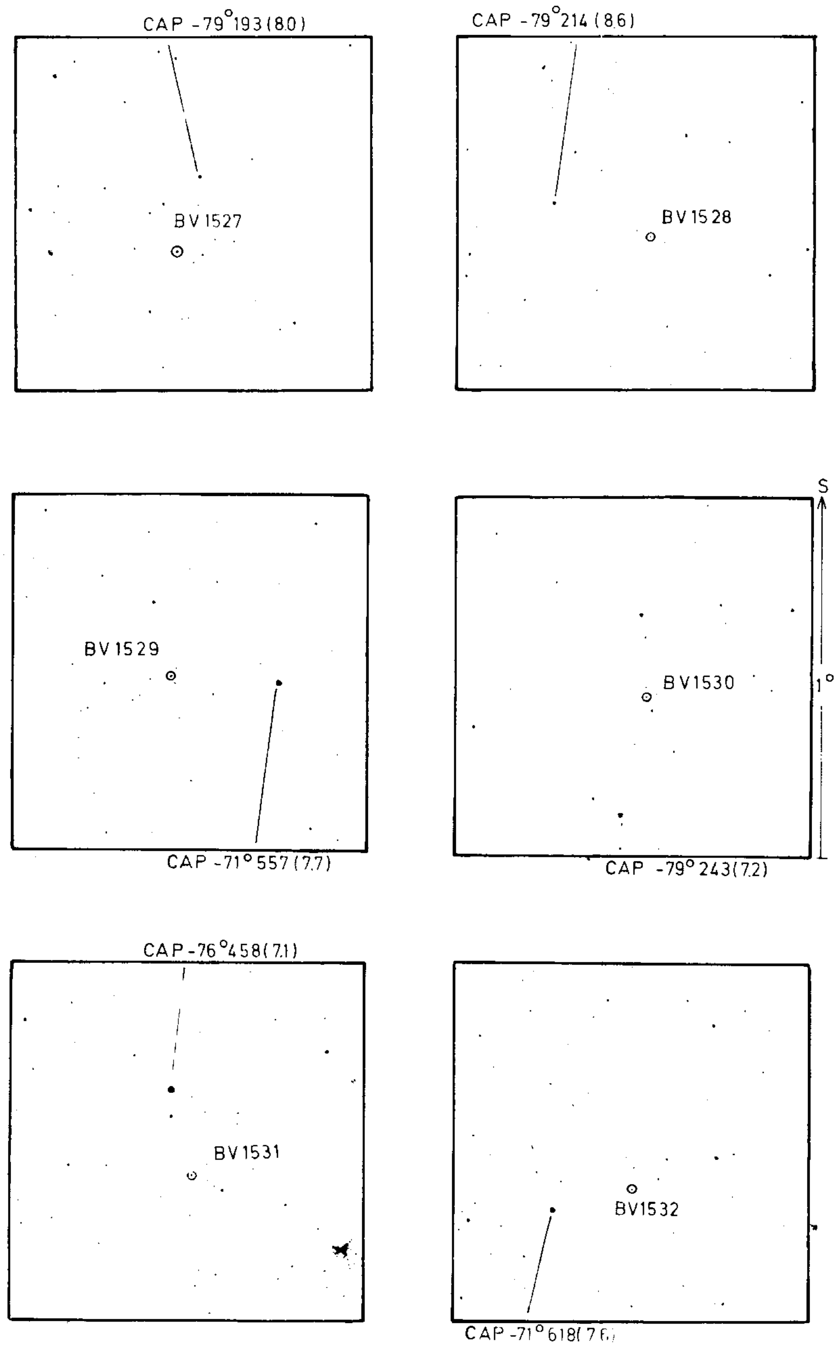
21 only one bright maximum, long period
22 many maxima and minima, irregular type
23 many maxima and minima, rather difficult
24 few minima, not enough for a period
25 irregular type
26 many minima, but more maxima
27 few minima, not enough for a period, eclipsing binary

Bamberg, January 1973

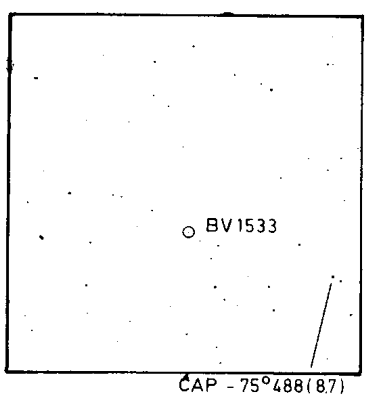
R. KNIGGE



BV1521
CAP -72° 236 (8.5)
BV1522
CAP -78° 126 (8.8)
S
1°
BV1523
CAP -79° 141 (6.8)
BV1524
CAP -74° 292 (9.2)
CAP-70° 318 (8.6)
BV1525
CAP -71° 301 (8.7)
BV1526
S
1°



CAP -79°193 (8.0)
BV 1527
CAP -79°214 (8.6)
BV 1528
BV 1529
CAP -71°557 (7.7)
S
1°
BV 1530
CAP -79°243 (7.2)
CAP -76°458 (7.1)
BV 1531
BV1532
CAP -71°618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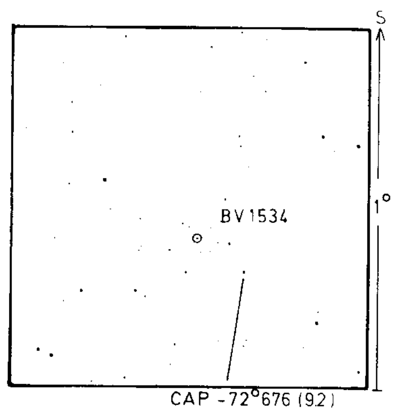
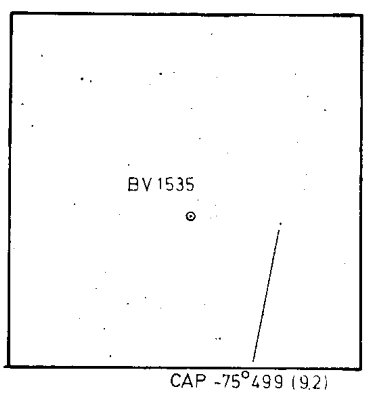
CAP - 75°488 (8.7)


S
1°
BV 1534
CAP -72°676 (9.2)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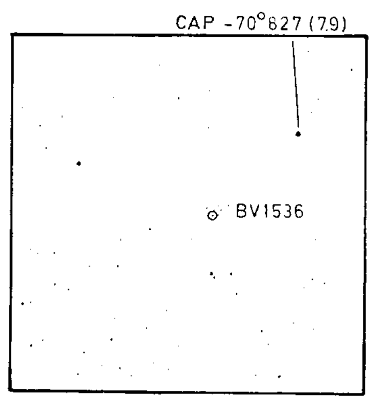
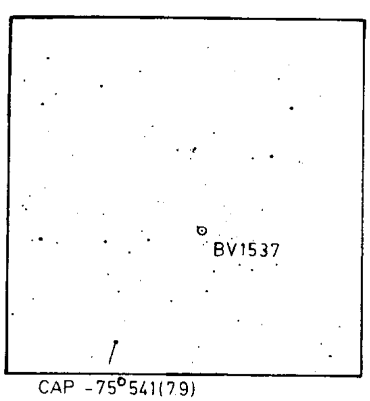
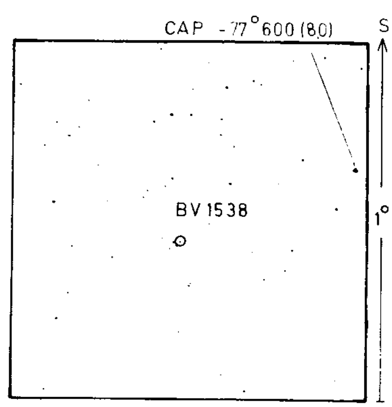
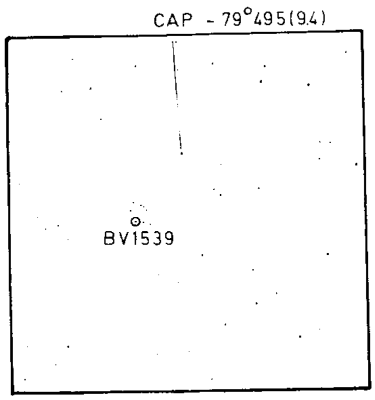
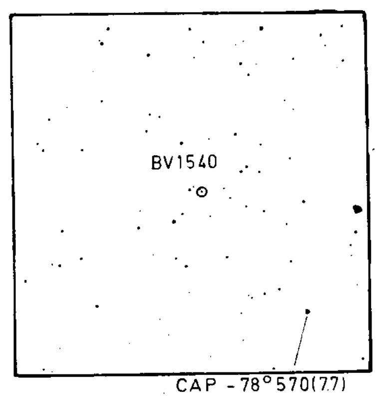
CAP -75°499 (9.2)


CAP -70°827 (7.9)
BV 1536


BV 1537
CAP -75°541 (7.9)


CAP -77°600 (8.0)
S
1°
BV 1538


CAP -79°495(9.4)
BV1539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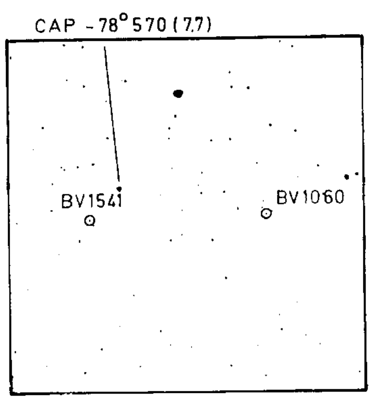
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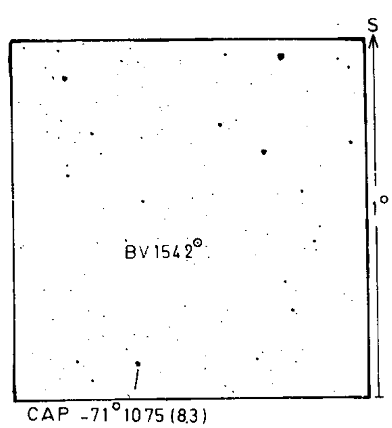
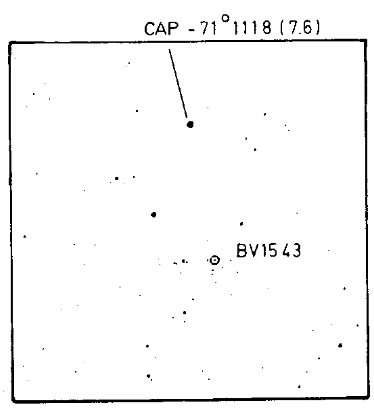
BV1541
BV1060


S
1°
BV1542
CAP -71°1075 (8.3)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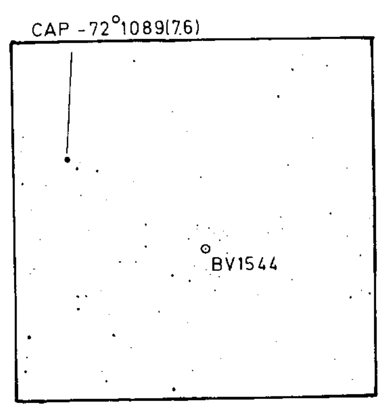
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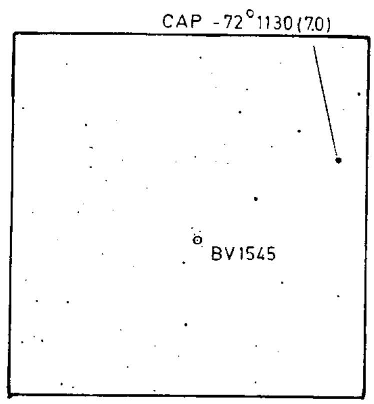
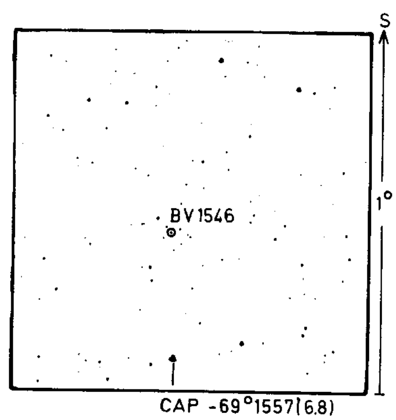
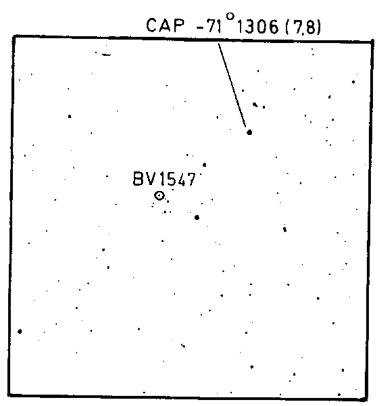
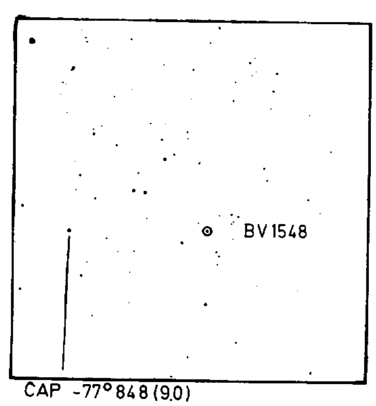
BV1544


CAP -72°1130(7.0)
BV1545


S
BV1546
1°
CAP -69°1557(6.8)


CAP -71°1306(7.8)
BV1547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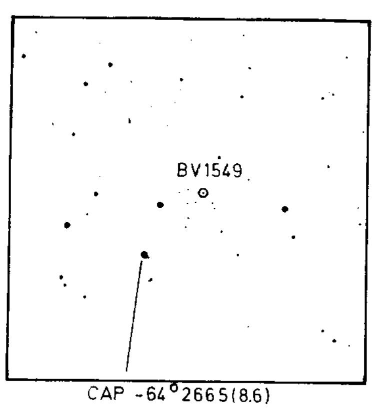
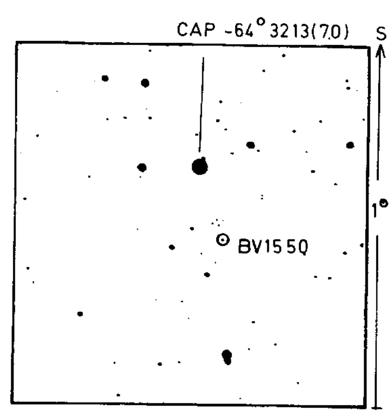
CAP -77°848(9.0)


BV1549
CAP -64°2665(8.6)


CAP -64°3213(7.0)
S
1°
BV1550

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 766

Konkoly Observatory
Budapest
1973 February 8

SUSPECTED LONG-PERIOD VARIABLE NEAR NGC 2368

The infrared object IRC-10162 (1950:$7^h18^m37^s$-$10^\circ16'.6$)has been suggested as a member of the loose open cluster NGC 2368 by Cohen (1971). who has published finding charts of the field. Low dispersion (495 A mm^{-1}) near-infrared (6500-9000 Å) image tube spectra have recently been obtained of IRC-10162 with the 1 meter reflector at the Wise Observatory. Those observations (summarized below) indicate that the star exhibits spectral changes which might be expected of a long-period variable:

U.T. Date	J.D.	Spectral Type
27 November 1972	2441649.5	M7
13 January 1973	2441696.4	M9

The spectral types were estimated from the strengths of the near-infrared VO bands (heads at 7400 and 7900 Å). Standards used for comparison were o Cet at minimum light (M9), RT Vir (M8),and Z Cnc (M6). The IRC catalogue (Neugebauer et al. 1969) records three observations of IRC-10162 over an interval of approximately one year. During this time a $\Delta I = 0^m.56$ (effective wavelength of I = 8400 Å) was observed. Both the spectroscopic and photometric observations indicate that IRC-10162 is a variable star. We suggest that it is most likely a long-period variable.

The intergrated magnitude of NGC 2368 is 11.8 (Collinder 1931). According to Cohen (1971) there is no photometry, however, available for individual cluster members. From a cursory inspection of Cohen's finding charts, IRC-10162 appears to be among the brightest stars of the cluster which is in accord with the hypothesis that the alleged long-period variable is a cluster member. Because there are so few long-period variables known to be members of clusters,we urge that further observations be made of IRC-10162 to confirm type variability as well as cluster membership.

—

We acknowledge the Wise Observatory of Tel-Aviv University and the Smithsonian Research Foundation Grant SFC-0-3005 for the use of their facilities at Mitzpeh Ramon, Israel.

January 31, 1973

S. WYCKOFF and P. WEHINGER
Wise Observatory
Tel-Aviv University, Israel

References:

Cohen, M., 1971, Astrophys. Letters, 9, 95.
Collinder, P., 1931, Annals Obs. Lund, 2.
Neugebauer, G., and Leighton, R.B., 1969, Two Micron Sky Survey: A Preliminary Catalog (NASA, SP-3047).

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 767

Konkoly Observatory
Budapest
1973 February 12

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR YZ CMi DURING THE 1972-73 30 DECEMBER - 12 JANUARY INTERNATIONAL PATROL.

The preliminary results of YZ CMi photoelectric observations carried out at the Catania Astrophysical Observatory during the observing period proposed by the IAU Working Group on Flare Stars (Chugainov P.F. 1972, IBVS 744) are given.

The observations were made in b light with a 91 cm cassegrain type reflector feeding a classical one-channel photoelectric photometer and with a 61 cm universal type reflector feeding a synchronous u, b, v photometer.

The detailed coverage intervals are given in the accompaniing Table 1.

Only one flare was detected during the $3\overset{h}{.}5$ patrol. The characteristics of the observed flare are reported in Table 2 and the light curve is given in the Figure.

The explanation of symbols and details of the observing equipment can be found in a preceding number of this Bulletin(Cristaldi S., Rodonò M., 1971, IBVS 525).

Catania Astrophysical Observatory,
Italy
January 31, 1973

S. CRISTALDI and M. RODONÒ

Table 1

Detailed Coverage

Date	Tel.	Light	Coverage (U.T.)	Total coverage	$\overline{3\sigma/I_o}$
110173	91	B	2345-2400; 0000-0009; 0025-0134; 0147-0201; 0209-0214; 0224-0233; 0245-0330; 0334-0419.	211	0.07
120173	61	B/V	2221-2226; 0006-0017; 0031-0039; 0056-0100; 0106-0112; 0116-0143; 0147-0319; 0325-0408; 0420-0428.	204	/.16/.10

Table 2

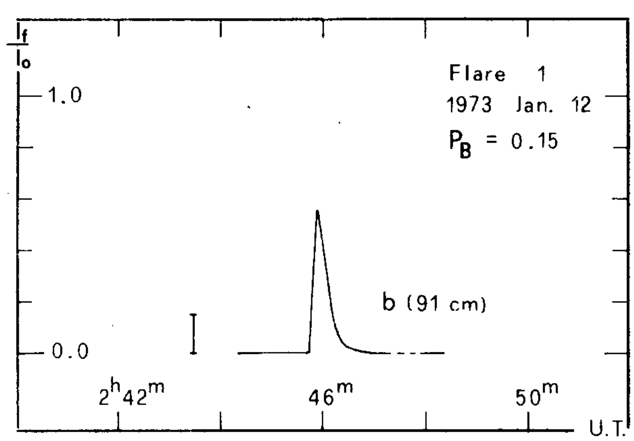
Flare characteristics

Date (UT): 1973 Jan. 12, $02^h45^m.9$ (JD_{hel} 2441694.6206)

$d_b = 0^m.17$ $3\sigma/I_o = 0.07$ P = 0.15 1.90×10^{30}er

$d_a = 0^m.82$ $(I_f/I_o)_{max} = 0.49$ Air mass = 1.54

Sky : some cirrus, moonless



COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 768
Konkoly Observatory
Budapest
1973 February 13

ON THE PERIOD LUMINOSITY RELATION OF MIRA TYPE VARIABLES

M.L.CLAYTON and M.W.FEAST (1969), by means of statistical parallaxes, have derived visual absolute magnitudes for Mira type variables of spectral class M, both for mean maxima M_m, and for mean light intensity M_l. In spite of a considerable scattering of the group values, a smooth slope of intrinsic brightness is indicated for periods longer than 150 days.

Now, the present author has found that hyperbolic interpolation fits the results just mentioned very well. For the visual absolute magnitudes of mean maxima the following formula may be used:

$$M_m = - \frac{200}{P - 100} - 0.32 \ , \qquad (1)$$

whilst the absolute magnitudes of mean light intensity are represented by another formula:

$$M_l = - \frac{680}{P - 15} + 2.75 \ . \qquad (2)$$

From the table given below it is evident that the approximation attained is in most cases quite satisfactory taking into account the great uncertainty resulting from the statistical parallaxes. especially in groups containing less than 20 stars. Formula (1) may be used safely within the whole range of periods between 160 and 500 days. Formula (2) holds equally well up to 400 days, but there remain some doubts as to its reliability beyond this limit.

The mean values of periods in the first columne of the present table differ slightly from those given by CLAYTON and FEAST, since they have been re-calculated in such a way that, if inserted into the above formulas, exactly the same values of 200/(P - 100), and 680/(P - 15) might result, as if the respective mean values over the individual stars of each group, or over all 35 stars with periods greater than 400 days, had been taken. But even in this latter case the alteration with respect to the direct arithmetical mean of the periods does not exceed -5 days.

Finally, it should be mentioned that twice the difference between formulas (2) and (1) represents something like a computed mean amplitude, i. e. mean minima minus mean maxima.

$$A_m = 2\ (M_l - M_m)\ . \qquad (3)$$

The computed mean amplitudes have a shallow minimum of $2^m.8$ at about P = 200 days.

Table

Comparison between the data of CLAYTON and FEAST, and the interpolation formulas (1) and (2). Computed values for the presumable limit of validity at P = 160 days are given in the first line. N = number of stars included in the original data. The data for P = 452 (in brackets) are weighted means of the preceding and following lines. Standard errors of original data always exceed $\pm 0^m.2$.

P	Mean Maxima				A_m	Mean Light Intensity			
days	Data	(1)	O – C	N		Data	(2)	O – C	N
160	$\overset{m}{\dots}$	$-3^m.66$	$\overset{m}{\dots}$	..	$3^m.4$	$\overset{m}{\dots}$	$-1^m.95$	$\overset{m}{\dots}$	..
174	−3.0	−3.02	+.02	22	3.0	...	...	...	..
175	...	...	...	..		−1.5	−1.50	.00	22
225	−1.8	−1.92	+.12	51	2.9	−0.5	−0.49	−.01	48
274	−1.6	−1.47	−.13	54	3.2	+0.2	+0.13	+.07	52
324	−1.3	−1.21	−.09	66	3.5	+0.5	+0.55	−.05	65
376	−0.85	−1.04	+.19	34	3.8	+0.9	+0.87	+.03	32
418	−1.0	−0.95	−.05	19	4.0	+0.4	+1.06	−.66	17
452	(−1.0)	−0.89	−.11	(35)	4.2	(+1.22)	+1.19	+.03	(33)
500	−1.0	−0.82	−.18	16	4.3	+2.1	+1.35	+.75	16

Literature:

M. L. CLAYTON and M. W. FEAST, Absolute Magnitudes of Mira Variables. Monthly Not. R. A. S. 146, 411-421 (1969).

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 769

Konkoly Observatory
Budapest
1973 February 22

THE PERIOD OF VARIABLE 7 IN M13

Arp, in the course of his work on the color-magnitude diagram of M13 = NGC 6205, found that his observations of Variable 7 of this cluster could be fitted with a period of $0^{d}.2388$ (Arp 1955, Astron. J. 60, 317). Recently, however, Demers (1971, Astron. J. 76, 445) has questioned this period, finding that it did not represent well his magnitude measures from plates taken to determine the UBV colors of the M13 variables. But because his data, as well as Arp's, was very limited for a period determination he did not try to find a better value.

In an attempt to clarify the situation we have measured the brightness of Variable 7 with an iris photometer on the 57 blue plates of M13 at our disposal. As the star was found to show considerable variation within a few hours, the period is obviously short and we therefore used the method of Lafler and Kinman (1965, Astrophys. J. Suppl. 9, 216) to search for the possible periods in the range 0.20 to 0.33 d. We found that for this range only two periods (which differ by one in their reciprocals) will fit our data:0.23803 d. and 0.31293 d. While the former period is close to that derived by Arp, we prefer the larger value because, first, periods of this order are more common and, second, it produced a light curve with significantly smaller scatter. In addition, the longer period fits Demer's U,B, and V observations within the uncertainties expected from photographic photometry. Thus, the characteristics of Variable 7 as derived from our observations are: Period = $0^{d}.312929$, Epoch of maximum: JD 24 40051.763, Mean B magnitude = 15.15, and Amplitude = 0.35 mag.

The details of this study will be published elsewhere along with the results for the other variables in this cluster.

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COMMISSION 27 OF THE I. A. U.

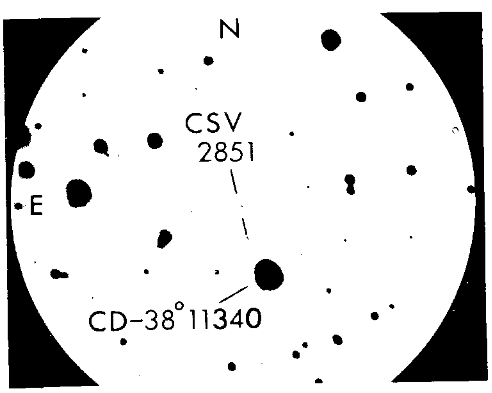
INFORMATION BULLETIN ON VARIABLE STARS

Number 770

Konkoly Observatory
Budapest
1973 February 23

CSV 2851: AN EMISSION-LINE, M-DWARF STAR

From low-dispersion, objective-prism plates we find that the suspected irregular variable CSV 2851 = HV 10814 = BPM 61550, is a dM3e star showing hydrogen and CaII emission. This star has been previously classified as K5: (Harvard Annals 109, No.9, 1943) with no mention of emission lines. However, several plates taken in June and July 1967 suggest that, at least during that period, the emission was not transitory in nature. The spectroscopic classification of this star as a dwarf is consistent with the BPM proper motion of 0"15 per year. The estimated apparent visual magnitude is 10.5. As the identification chart shows, the star is located about 3' northeast of CD-38° 11340.



N. SANDULEAK and C.B. STEPHENSON
Warner and Swasey Observatory

Correction to IBVS No 749.

Dr. WACHMANN asked to make the following corrections:

p. 2. Table 1.	HBV 479	Min I = 14.22	instead of		15.02
	481	δ = +63°30'21"7	"	"	63°20'21"7
	492	δ = +63°34'40"8	"	"	63°34'41"8
p. 3. Table 2.	HBV 479	a = $12^m.27$	"	"	$12^m.77$
p. 7.	HBV 485	The variable is the eastern component of a double star (instead of western).			

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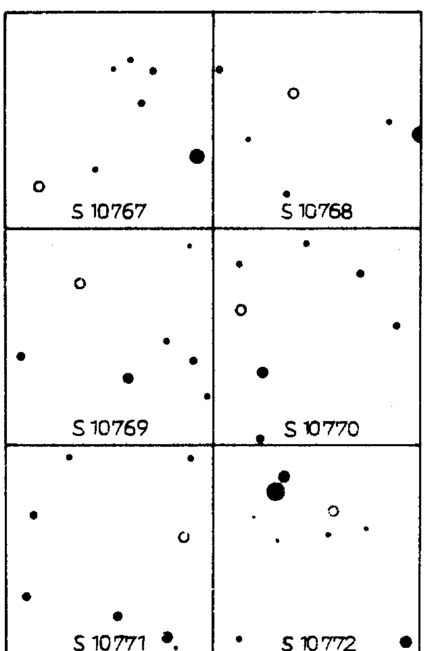
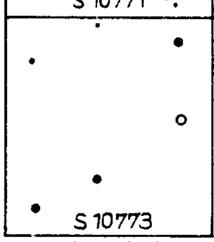
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 771

Konkoly Observatory
Budapest
1973 February 28

NEW FLARE STARS IN THE PLEIADES





On 14 plates of the 50/70/172 cm Schmidt-type telescope at Sonneberg Observatory in the period from 1972 September 6 to 1973 January 6 seven new flare stars were discovered. Of two previously known objects, No.157 (G.Haro, E.Chavira, Flare Stars in the Pleiades Region II. Tonantzintla y Tacubaya Bol. 5.,p.181) and No.196 (V.A.Ambartsumyan et al., Flare Stars in Pleiades, II. Astrofisika 7, p. 319.) flares were observed.

The effective observational time amounts to 42.6 hours. The observations were made on 53 different exposures (3 to 5 per plate and 40 to 60 minutes for each) in blue (ORWO-ZU2-emulsion + filter GG 13) and ultraviolet ORWO-ZU 2-emulsion + filter UG 2) light.

The Table (s. overleaf) summarizes the data of the flare stars: the variable star number of Sonneberg Observatory, the position 1900.0, the brightness in minimum in B or U, the observed amplitudes of the flares in B or U (ΔB, ΔU), the mean Julian Dates of the exposures in maximum brightness and their duration. The Table also comprises the known flare stars 157 and 196.

In the Figure identification charts are given. They represent areas approximately $4' \times 4'$. North is on the top.

Data for Observed Flares

No.	Design.	RA 1900.0	D	$B_{Min.}$	$U_{Min.}$	ΔB	ΔU	J.D. 244....	Exp. time
1	S 10767	$3^h37^m.0$	$+25^\circ00'$	$17^m.0$		0.5		1596.540	60 min
2	S 10768	3 38.7	+24 17	>17.5		>1.1		1683.317	40
3	S 10769	3 40.5	+22 44	17.3		1.2		1597.519	60
4	S 10770	3 42.2	+24 12	17.4		0.6		1600.513	40
5	S 10771	3 43.4	+24 30	17.3		0.6		1595.507	60
6	S 10772	3 44.4	+22 22	17.0		0.5		1601.542	40
7	S 10773	3 44.8	+24 28	17.1	>17.7		>0.9	1682.264	60
	157	3 43.1	+23 26	17.1		0.9		1597.519	60
				17.1		0.6		1602.604	40
	196	3 39.3	+24 15		>17.8		>0.8	1685.333	50

February 9, 1973

W. GÖTZ

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Sternwarte Sonneberg

I.B.V.S.
NUMBER 772

Konkoly Observatory
Budapest
1973 March 8

VISUAL OBSERVATIONS OF AD LEONIS

The flare star AD Leo was observed visually for a total of 14.4 hours during the January-February 1973 international programme by members of the Variable Star Section of the British Astronomical Association. Hours of coverage are given below, parentheses indicating poor sky conditions.

1973	U.T.	Observers
Jan 27	2105-2140, 2200-2230, 2249-2320	AMS, DK
30	(2037-2248)	AMS, DK
Feb 1	(2016-2035), (2130-2229)	AMS, DK, JRS
3	2116-2120, (2130-2150), 2150-2236, 2318-2400	AMS, DK, KH, RM, GP, DK, FG, PAM
4	0000-0109, (0112-0157), 0200-0351, (0353-0437), 0439-0454	AMS, KH, RM, GP, DK, FG, PAM
9	2015-2051, 2356-2400	DK, FG, GP, JK, RAP
10	0000-0200	RAP

The observers were A.M. Savill, D. Keir, J.R. Savill, K. Hall, R. McKay, G. Prior, F. Gribbin, P.A. Moore, J. Kent, R.A. Paterson.

Slow variations on a time scale of minutes or tens of minutes were suspected by several observers, but their reality is doubted. Six possible flares were recorded:

1973	U.T.	Amplitude	Duration
Jan 27	$21^h05^m.0$	$0^m.7$	6^m
Feb 3	21 49.5	0.6	7
4	00 46.0	0.3	5
	02 49.0	0.7	9
	03 25.0	0.5	3
9	20 47.0	0.3	2

Total coverage 14^h21^m over 5 nights.

British Astronomical
Association

J.E. ISLES

CORRECTED PERIOD FOR MT Her

The following observations were used to determine a more accurate period for the eclipsing binary MT Her:

Minima J.D.hel 24.....	
26 860,427	H.U.Sandig, AN 278, 1950, 187
28 749,401	"
31 000,210	GK Moscow 1969
33 180,304	H.U.Sandig, AN 278, 1950, 187
34 226,447	M.Kaprowicz, SAC 25, 1954
34 248,409	V.Zonn, PZ 10, 1956, 413
34 907,787	J.C.Koch and R.H.Koch, AJ 67,1962,462
34 960,466	V.Zonn, PZ 10,1956, 413
40 716,508	Contr.Brno Obs.,No.12, 1971
40 756,989	"
40 759,439	"
41 114,495	Contr.Brno Obs.,No. 14, 1972
41 117,417	"
41 154,481	"

The new light elements are:

$$\mathrm{JD} = \underset{\pm 2}{2441117{,}417} + \underset{\pm 29}{0^{d}{,}48771779}$$

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 773

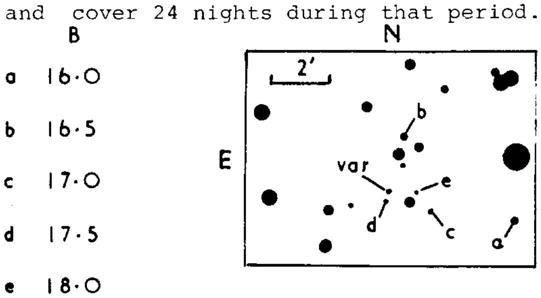
Konkoly Observatory
Budapest
1973 March 14

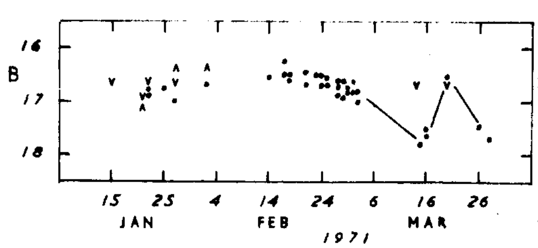
A NEW VARIABLE STAR IN THE LMC WITHIN THE ERROR BOX OF THE X-RAY SOURCE LMC X1

In identifying the optical counterparts of discrete X-ray sources a knowledge of all variable stars within the error box is of interest. Although several criteria such as synchronous variation at X-ray and optical wavelengths may eventually be applied to all possible candidates, pecular photometric (flare-like) or colorimetric properties (ultraviolet excess) have previously been considered. The error box of LMC X1 (2U 0540-69),an area of about 80 square minutes of arc centred at:

$5^h40^m58^s$ $-69^\circ48'00''$ (Equinox 1950)

as given in the Uhuru Catalogue (Giacconi et al. 1972),has been searched for variables on 32/36-inch Baker-Schmidt plates. The plate-filter combination used matched the standard B band (103a-O+ +BG12 + GG18), and the exposure time (30 mins) reached a limiting magnitude of about 18.5. A total of 42 plates taken by Dr.T. W. Rackham at the Boyden Observatory between 15 January and 28 March 1971 were available from the Armagh Observatory collection, and cover 24 nights during that period.





The error box contains the irregular variables HV 2764 and 2760,as well as a small region of emission nebulosity of 30 Doradus. Identification with 30 Dor has been discounted by Leong et al. (1971).The newly discovered variable lies about 6 mins of arc south of the error box, i.e. just within the error region of 90 percent confidence,at the approximate position:

Equatorial coordinates $5^h41^m.2$ $-69^\circ54'$ (1950)

Harvard coordinates X = 17030 Y = 7060

A finding chart together with the comparison stars used is given below. The sequence is very approximate and was extrapolated using the photoelectric magnitudes of Walker and Morris (1968) and the estimated ADH plate limit. The brightest star in the field of the chart has a B magnitude of about 11.1 but appears to be anonymous. A light curve is also shown in which the star exhibits a range of 1.5 mags from 16.2 to 17.7, appearing usually bright. The variable was faint on the nights 15-16 March and 26-28 March 1971.

Further photometric and particularly colorimetric investigations might be profitable. The author is indebted to Dr.C.J. Butler of Dunsink Observatory for drawing his attention to this X-ray source, although he points out that variation of the source itsefl is still uncertain.

Armagh Observatory
7 March 1973

A. D. ANDREWS

References:

Giacconi, R., Murray, S., Gursky, H. and Kellogg, E., 1972, Ap.J. 178, 281.

Leong, C., Kellogg, E., Gursky, H., Tanabaum, H., and Giacconi, R., 1971, Ap.J. (Letters) 170, L67.

Walker, G.A.H., and Morris, S.C., 1968, A.J. 73, 772.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 774

Konkoly Observatory
Budapest
1973 March 15

ON THE VARIABILITY OF θ CORONAE BOREALIS

The first indication of photometric variability of θ CrB has been reported by T.P.Roark (1). According to his four-colour ubvy and H_α-filter observations on June 16, 17, 18 and 19, 1970 θ CrB showed rapid variations as large as $0^m.7$ in the u and v bands. But at the same time the star was nearly constant when observed in the y and H_α filters. On June 20, September 15 and 16, 1970 the star did not show significant light variations in any colours.

Our UBV photoelectric observations of β CrB could be used to check the variability of θ CrB as this star was used as a comparison star together with another one - μ BooA. These UBV observations were obtained with the 13" reflector of the Simeis Branch of the Crimea Observatory on 21 nights between June 22 and August 24, 1970. Adopting for μ Boo $A_V=4^m.29$, $B-V=0^m.32$, $U-B=0^m.04$ (2) UBV values for θ CrB have been obtained. They are given in Table 1, showing no significant light variations of θ CrB in any wave band during the observations.

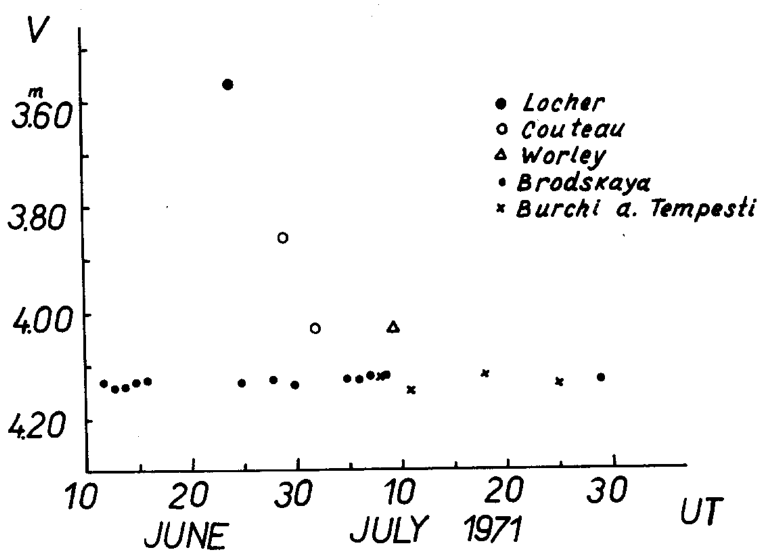
On July 1971 the Bureau for Astronomical Telegrams informed that on June 29 and July 2 P.Couteau observed θ CrB as a double star with a companion at the distances $0''.46$ and $0''.47$ of brightness $5^m.5$ and $6^m.7$, respectively (3). But on May 10 the star under consideration was observed as a single one. On July 9 C.E.Worley observed the companion at $0''.55$ with $\Delta m_V \sim 2^m.5$ (4).

Table 1

1970	UT	V	B-V	U-B	n
June	22.3	4.130	-0.122	-0.560	5
	23.3	4.135	-0.118	-0.570	5
	26.3	4.130	-0.118	-0.550	10
	27.3	4.120	-0.128	-0.558	7
	30.3	4.128	-0.127	-0.581	6
July	4.3	4.129	-0.139	-0.580	7
	5.3	4.131	-0.127	-0.581	9
	6.3	4.130	-0.124	-0.577	4
	7.3	4.131	-0.112	-0.564	5
	11.3	4.130	-0.121	-0.560	8
	15.3	4.121	-0.117	-0.548	7

Table 1 (cont.)

1970	UT	V	B-V	U-B	n
July	16.3	4.123	-0.115	-0.577	4
	17.3	4.124	-0.115	-0.569	8
	26.3	4.130	-0.112	-0.524	8
August	3.3	4.121	-0.122	-0.560	4
	10.3	4.137	-0.127	-0.536	7
	14.3	4.136	-0.130	-0.565	7
	17.3	4.124	-0.116	-0.552	7
	20.3	4.139	-0.115	-0.555	7
	22.3	4.132	-0.130	-0.563	7
	24.3	4.118	-0.116	-0.569	5



Later on it was communicated that K.Locher estimated on a panchromatic plate taken on June 24, 1971, that θ CrB was by $0^{m}.5$ brighter than usually (5).

From July 8, 1971 after the announcement of Couteau's observations θ CrB was observed by R.Burchi and P.Tempesti at Teramo Observatory (6). Their observations did not show any brightness variations of θ CrB.

In summer 1971 our observations of β CrB were continued using only one comparison star θ CrB. Taking into account the regular, and well known variability of β CrB from previdious observations with an amplitude as small as $0^{m}.03$ it was possible to check the constancy of θ CrB using now β CrB as comparison star. The results are given in Table 2. No light variations of θ CrB are to be found, confirming the results of R.Burchi and P.Tempesti. For illustration the results of Teramo and Crimean observations are plotted in Fig.1. Locher's magnitude of June 24, 1971 and the magnitudes of June 29, July 2 and 9, 1971 given by Couteau and Worley are also plotted.

Further regular photographic observations of θ CrB and the check of its visual duplicity are of great interest.

Table 2

1971	UT	V	n
June	12.3	4.133	5
	13.3	4.142	5
	14.3	4.139	9
	15.3	4.134	9
	16.3	4.127	7
	25.3	4.134	6
	28.3	4.133	6
	30.3	4.135	6
July	5.3	4.125	8
	6.3	4.124	5
	7.3	4.118	7
	8.3	4.118	6
	29.3	4.130	8

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Crimean Astrophysical
Observatory

References:

(1.) T.P.Roark, Astron.J. 76,634, 1971.
(2.) Tolbert, C.R., Astrophys.J. 139,1105, 1964.
(3.) Couteau, P., Circ.Bur. cent.int.Telegr.astr.n.2339,1971.
(4.) Worley, C.E., Circ.Bur.cent.int.Telegr.astr.n. 2340, 1971.
(5.) Locher, K., Circ.Bur.cent.int.telegr.astr.n. 2342, 1971.
(6.) Burchi R. and Tempesti P., IBVS n. 619, 1972.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 775

Konkoly Observatory
Budapest
1973 March 15

MINIMA OF ECLIPSING VARIABLES

This report continues the ones in IBVS 187 and 299 and contains 48 observed minima of 11 eclipsing variable stars. The observations are photographic (pg) or photoelectric (pe). The photoelectric observations were made using a 50 cm Newton reflector and a photometer employing an unrefrigerated 1P21 photomultiplier tube.

The heliocentric moments of minima were determined by the method of the mean light curve (Todoran 1969) and that of the bisection curve (Todoran 1968).

Elements in the General Catalogue of Variable Stars were used to compute O-C's for: U Cep, V477 Cyg, W Del, and UX UMa; for the other stars the author's elements given in IBVS 299 and 636 were used. The number of observations is given under n.

J.D. hel. (2400000)		O-C	E	n
XZ Andromedae				
39865.4720	pg	+0.^{d}0054	2496	15
40070.4145	"	-0.0036	2647	6
40093.4890	"	-0.0031	2664	10
40127.4215	"	-0.0029	2689	14
40135.5675	"	-0.0007	2695	7
40138.2800	"	-0.0028	2697	10
40157.2900	"	+0.0051	2711	17
40446.3850	"	-0.0036	2924	13
40454.5260	"	-0.0064	2930	6
U Cephei				
41198.4067	pe	+0.0189	1166	20
41218.3500	"	+0.0179	1174	16
41223.3360	"	+0.0178	1176	30
RW Coronae Borealis				
41445.4531	pe	-0.0045	28970	29
41464.3405	"	-0.0037	28996	16
41469.4255	"	-0.0036	29003	17
ZZ Cygni				
40115.3805	pg	+0.0032	30190	11
40139.2665	"	+0.0019	30228	11
40430.3150	"	+0.0012	30691	6
40445.4010	"	+0.0004	30715	15
40467.4030	"	+0.0009	30750	10
40682.3900	"	+0.0012	31092	11
40731.4215	"	+0.0008	31170	14

J.D. hel. (2400000)		O-C	E	n
V477 Cygni				
41464.4060	pe	$-0^{d}.0136$	3672	7
41478.4896	"	-0.0119	3678	32
W Delphini				
39709.562	pg	+0.107	4507	9
39978.700	"	+0.107	4563	11
40031.557	"	+0.097	4574	9
40079.600	"	+0.080	4584	10
40113.237	"	+0.074	4591	10
40137.266	"	+0.073	4596	18
40161.300	"	+0.077	4601	6
Z Draconis				
40654.5375	pg	+0.0015	5441	9
40684.3935	"	+0.0092	5463	6
41064.4795	"	+0.0064	5743	12
RZ Draconis				
41236.440	pe	-0.0062	21398	25
TU Herculis				
40153.261	pg	-0.025	1187	5
40681.455	"	-0.036	1420	12
40697.312	"	-0.048	1427	6
41062.309	"	-0.033	1588	7
41071.380	"	-0.030	1592	5
CC Herculis				
40677.5485	pg	+0.0180	8395	5
40710.4850	"	+0.0088	8414	10
41036.4775	"	+0.0120	8602	18
41062.4890	"	+0.0136	8617	10
41083.3020	"	+0.0188	8629	6
UX Ursae Majoris				
40600.605	pg	0.000	16127	9
40653.506	"	-0.004	16396	7
40656.455	"	-0.005	16411	6

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 776

Konkoly Observatory
Budapest
1973 March 19

NEW FLARE STARS IN THE PLEIADES REGION

Nine flare stars were discovered in the Pleiades region in a reexamination of photographic material obtained from September 1971 to January 1972 with the 90/65 Schmidt telescope of the Asiago Observatory.

Five new flare-ups in the star H_{II} 2411, six in the No.106 Asiago =Ton 18 , one in the No.24 Asiago = vMan 16 , and one in the No.30 Asiago were also found in old plates.

Table 1 summarizes the following data of the new flares: Asiago serial number, position, brightness (pg or U) at minimum, amplitude and date of the flare. The identification infrared chards of all the new flare stars are also given.

Table 1

No.	R.A.1900.0			D.1900.0		mag.min.		Δm	Date
108	3^h	42^m	23^s	$+22^o$	14!2	16.3	U	0.3	1971 Sep. 23
109	3	37	44	+25	40.8	16.2	pg	0.3	1971 Oct. 1
110	3	30	28	+24	34.3	16.3	pg	0.3	1971 Oct. 18
111	3	37	11	+23	33.9	15.8	pg	0.4	1971 Oct. 18
112	3	36	44	+23	40.4	16.5	pg	1.3	1971 Oct. 19
113	3	50	32	+23	59.9	(17	U	>1.4	1971 Oct. 25
114	3	35	47	+22	1.9	17:	pg	0.8	1971 Dec. 11
115	3	38	16	+23	57.2	(17	U	>1.8	1971 Dec. 22
116	3	42	10	+26	16.6	16.3	U	0.6	1972 Jan. 10

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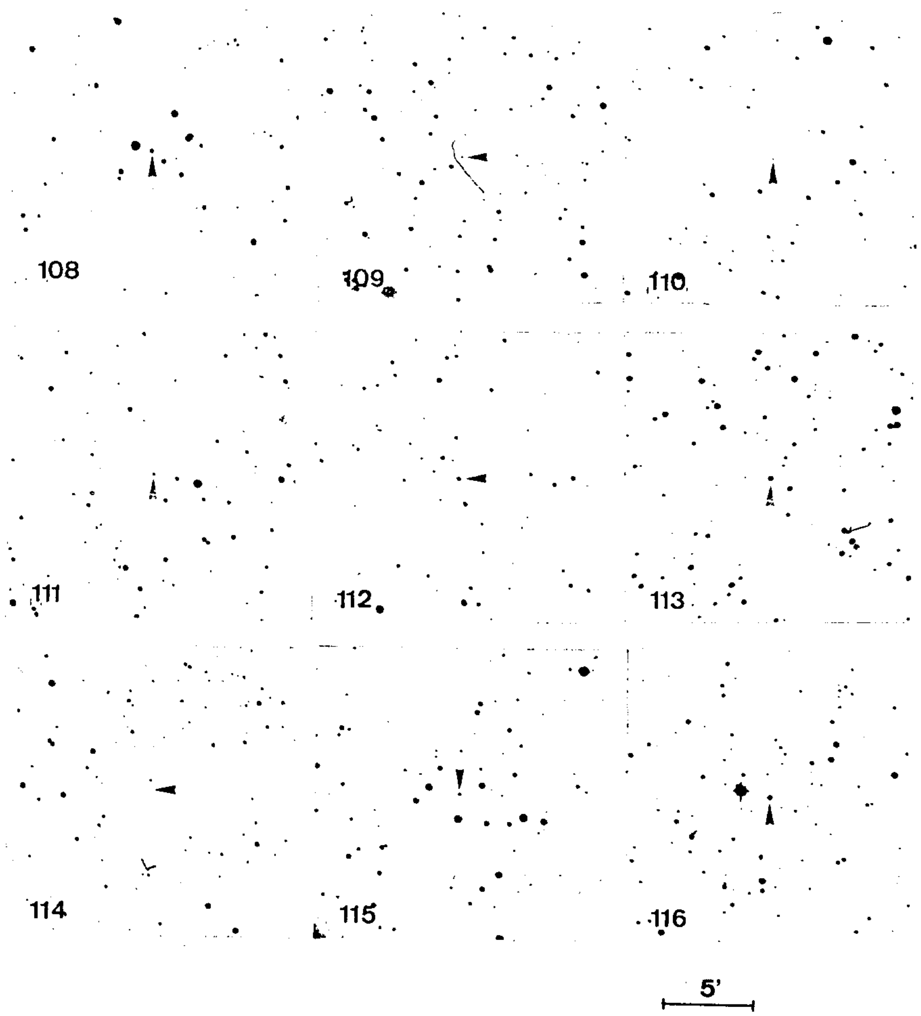
IDENTIFICATION CHARTS



COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 777

Konkoly Observatory
Budapest
1973 March 21

S10760 - A VERY DISTANT RR-LYRAE-STAR

On plates taken with the Tautenburg 134cm Schmidt telescope I discovered an RR-Lyrae-star (S10760) with P = $0^d.62722$ (Mitt. veränderl.Sterne 6,37). Its B-magnitudes were measured to be in the range $18^m.9$ to $19^m.9$. The interstellar extinction can be neglected (Pfau, AN 287, 97) in this way the distance of the star can be estimated from m-M = 19^m to be 63 kpc.

TWO NEW VARIABLE EXTRAGALACTIC OBJECTS

The nebulous object S10721 found by Meinunger and Richter (Mitt.veränderl.Sterne 5, 139) on Tautenburg plates is identical with the radio source No. 54 of the 5C3 catalogue (Pooley, 1969:MN 144,101).
The object S10765 (Meinunger, Mitt.veränderl.Sterne 6, 37), found on Tautenburg plates,too, appears slightly nebulous on the best plates. Radio emission was as yet not detected. The character of the brightness variations of both objects can be explained by supernova explosions, a hypothesis already suggested by Kurochkin (IBVS 743) in the case of 3C 446.

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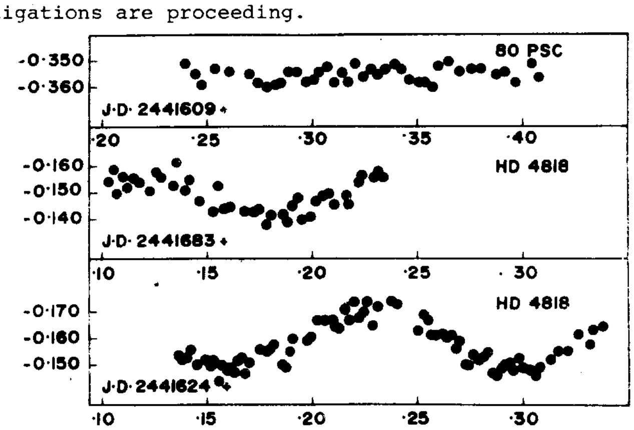
INVESTIGATION OF TWO DELTA SCUTI SUSPECTS

In our investigation of two suspected Delta Scuti variables, HD 4818 (HR 238; m(V) = $6^m.39$) and 80 Psc (HR 330; m(V)=$5^m.53$) as listed by Michael A. Seeds and Gail A. Yanchak (The Delta Scuti Stars, the Franklin Institute 1972), the former has been found to be variable. The observations were obtained in V filter on the 38cm reflector of this observatory, equipped with one channel photometer with an unrefrigerated 1P21 photomultiplier tube.

The light curves of HD 4818 on two nights, as shown in the figure show a period of very nearly $0^d.1360$ and a light amplitude of $0^m.025 \pm 0^m.01$. The spread of points in the ligth curve of 80 Psc on one night does not indicate a definite variation of its light beyond the instrumental limit of $0^m.01$. The comparison stars employed for HD 4818 and 80 Psc were HD 4881 (HR 241; m(V)= $6^m.20$) and 89 Psc (HR 378; m(V) = $5^m.17$) respectively. Further investigations are proceeding.



Light curves of 80 Psc and HD 4818 through V filter. The ordinates $\Delta m(V)$ are the differential instrumental magnitudes in the sense comparison minus variable star.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 779

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Budapest
1973 April 7

MINIMA OF ECLIPSING VARIABLES

The list below contains minima of eclipsing variables observed at the Fort Skala Observatory near Cracow. The heliocentric moments of minima and limits of errors were obtained by the tracing-paper method. The letter "n" following moments of minima denotes normal minima and column "N" denotes the number of observations. Column O-C was determined with elements given in "Rocznik Astronomiczny Obserwatorium Krakowskiego 1973".The observations were made with the Expedition Refractor o=203 mm, f=227 cm, except β Per.

star	J.D. hel. 244 0000-		O - C	N
XZ And	1544.434	$\pm 0^d.002$	$-0^d.014$	10
OO Aql	1544.480 n	0.005	+0.000	18
CX Aqr	1542.499	0.002	+0.021	8
CL Aur	1395.389	0.002	+0.041	7
SU Boo	1392.597	0.005	-0.002	9
YY CMi	1395.360	0.010	+0.010	6
TV Cas	1392.364	0.002	+0.019	9
AB Cas	1395.439	0.004	+0.029	8
V Crt	1392.431 n	0.010	-0.019	19
W Del	1545.480	0.010	+0.070	9
TY Del	1544.386	0.006	+0.014	14
SZ Her	1090.378	0.005	+0.002	7
	1395.535	0.002	+0.010	6
AV Hya	1392.316 n	0.005	-0.018	9
TZ Lyr	1392.512	0.005	+0.002	10
UZ Lyr	1766.527	0.003	+0.027	10
Z Per	1545.462	0.007	+0.016	9
RT Per	1766.443	0.005	-0.021	7
β Per	1389.289 n	0.004	-0.008	23
XZ Per	1395.380	0.001	+0.000	9
RS Sct	1542.422 n	0.005	-0.001	13
XZ UMa	1395.293	0.005	-0.067	7
W UMi	1395.368	0.005	+0.006	9

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POLARIMETRY OF SELECTED SPECTROSCOPIC BINARIES

In an ongoing broad-band photoelectric investigation of linear polarization, eighteen spectroscopic binaries have been surveyed to date. All observations have been made with the Pennsylvania two-channel polarimeter (Wolf 1972) attached to the 72-cm cassegrain reflector. The observational and reduction methods are adaptations of those of Clarke (1965). The results have been freed of the instrumental polarization by the usual technique of observing standard unpolarized stars (Serkowski 1965, 1968).

In the accompanying table we summarize the limits of the ob-servations obtained thus far. The successive columns give:
1, the HD number if available;
2, the binary name;
3 and 4, the filter and the number of observations with that filter, respectively;
5, the minimum observed polarization and its probable error;
6, the maximum observed polarization and its probable error;
7, the minimum observed angle of the plane of polarization in the equatorial system and its probable error; and
8, the maximum observed angle of the plane of polarization in the equatorial system and its probable error.

For a given filter, the values of θ_E^m and θ_E^M do not necessarily correspond to the tabulated values of P_m and P_M. The intention here is to demonstrate the ranges in measured values of P and θ in order to indicate whether an object displays variable polarization. If P is very small or has a large probable error, the result is an indeterminate value for θ_E.

The observations suggest that LY Aur, SZ Cam, RS CVn, SX Cas, AO Cas, KS Per, o Per, ϕ Per, υ Sgr, and ζ Tau exhibit time - dependent polarization. This is interpreted to mean that in addition to any interstellar component, these systems possess at least one intrinsic component of polarization. Variable components of polarization for LY Aur,SZ Cam,RS CVn,SX Cas,AO Cas,KS Per,and o Per have not been detected before.For AO Cas,the observations indicate that this binary possesses an asymmetric, homogeneous, systemic electron-scattering envelope and that the change in polarization arises from a combination of the variations in the stellar flux and apparent geometry of the envelope as the system revolves and rotates.

Although the observations are few, there are intimations that WW Aur, YY Gem, and Plaskett's star may also possess time-dependent intrinsic components of polarization and hence some sorts of distribution of scattering circumstellar material. In the case of YY Gem, a variable component of intrinsic polarization may be indicative of some vestige of pre-main-sequence activity.

Within the observational errors, α And, β Aur, β Per, BD+16°516, and TX UMa appear to have no variable component of polarization. In fact, β Aur and β Per seem to possess negligibly small polarization.

The wavelength dependences of the polarization for υ Sgr and ζ Tau agree with Coyne and Kruszewski's (1969) results but at this time we make no comment concerning the dependence for AO Cas and LY Aur.

Polarimetric observations are continuing for all the above systems and additional objects are being added to the survey.

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HD	BINARY	FIL.	n	P_m(%)	P_M(%)	θ_E^m	θ_E^M	Remark
358	α And	V	3	0.17± 0.08	0.32±0.05	4°± 13°	176°± 4°	
1337	AO Cas	U	2	0.52 0.08	0.66 0.04	42 2	49 3	
1337	AO Cas	B	7	0.55 0.09	0.73 0.07	30 4	43 2	var.
1337	AO Cas	V	16	0.58 0.05	0.87 0.05	41 3	57 3	var.
1337	AO Cas	R	1	0.41 0.07	----	38 4	----	
10516	φ Per	V	10	0.77 0.07	1.42 0.12	32 2	83 3	var.
19356	β Per	V	2	0.08 0.07	0.14 0.06	69 12	93 24	
23180	ο Per	B	3	0.46 0.05	0.76 0.08	23 5	26 3	var.
23180	ο Per	V	10	0.31 0.07	0.58 0.06	17 4	34 4	var.
---	+16° 516	R	2	0.20 0.21	0.40 0.15	28 31	159 11	
25638	SZ Cam	V	4	6.20 0.07	6.44 0.07	140.2 0.3	141.1 0.3	var.
30353	KS Per	V	6	1.84 0.09	2.18 0.12	147 1	161 1	var.
35921	LY Aur	U	1	1.75 0.11	----	147 2	----	
35921	LY Aur	B	1	2.12 0.10	----	144 1	----	
35921	LY Aur	V	10	1.49 0.07	2.01 0.06	140 1	147.4 0.7	var.
35921	LY Aur	R	2	1.37 0.12	1.78 0.11	140 2	144 2	var.
37202	ζ Tau	U	2	1.08 0.09	1.13 0.06	26 2	28 2	
37202	ζ Tau	B	2	1.44 0.06	1.45 0.06	29 1	34 1	
37202	ζ Tau	V	11	0.93 0.08	1.35 0.04	23 3	34 1	var.
37202	ζ Tau	R	9	1.03 0.05	1.34 0.06	29 2	36 1	var.
40183	β Aur	V	2	0.05 0.08	0.12 0.06	78 43	91 13	
40183	β Aur	R	1	0.03 0.06	----	83 55	----	
46052	WW Aur	V	3	0.08 0.05	0.25 0.04	27 15	126 10	var.
47129	Plaskett's	V	3	0.88 0.08	0.99 0.05	141 3	158 3	var.
---	YY Gem	R	2	0.27 0.08	0.97 0.11	65 8	132 3	var.
93033	TX UMa	B	2	0.08 0.07	0.15 0.03	16 30	167 6	
93033	TX UMa	V	3	0.07 0.07	0.23 0.06	23 11	80 34	
114519	RS CVn	V	8	0.06 0.06	0.58 0.11	46 12	143 20	var.
181615	υ Sgr	U	2	0.72 0.13	0.89 0.05	163 2	172 5	
181615	υ Sgr	B	3	0.93±0.08	1.10±0.11	157 ± 2	172 ± 3	var.
181615	υ Sgr	V	3	0.82±0.07	1.01±0.05	173 ± 3	176 ± 2	var.
181615	υ Sgr	R	2	0.73 0.07	0.80 0.08	176 3	177 3	
232121	SX Cas	B	1	0.76 0.15	----	61 5	----	
232121	SX Cas	V	4	0.36 0.08	0.77 0.10	0 6	47 5	var.
232121	SX Cas	R	16	0.27± 0.10	0.88±0.08	22°± 5°	59°± 10°	var.

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LARGE POLARIZATION VARIATIONS IN CIT 6

An infrared object CIT 6 = IRC +30219 is known to have large, variable, intrinsic polarization (Kruszewski 1971, Dyck et.al.1971). It was classified as a cool carbon star (Wisniewski et al.1967,Pesch 1967, Lockwood 1970). New set of observations was obtained with the Steward Observatory 230 cm and Lunar and Planetary Laboratory 154cm reflectors.

The following table lists new polarimetric measurements together with estimates of brightness.

J.D. 2441000+	Filter	m	P%	m.e.	θ°
635.948	I	9.6	7.6	± 1.1	116
651.057	I		8.1	0.6	114
655.828	I		8.1	0.5	115
635.957	R	10.2	6.3	0.5	117
651.047	R		6.1	0.3	117
655.847	R		6.7	0.4	117
635.973	O	12.3	2.7	0.7	154
651.052	O		4.2	0.8	146
655.838	O		2.7	0.7	146
651.018	V	13.4	4.9	0.2	176
653.955	V	14.8	11.5	0.3	181
653.982	V	14.7	11.5	0.5	183
655.860	V		10.5	0.3	180
657.922	V		7.7	0.4	178
658.000	V	14.0	7.8	0.2	182
657.962	G	14.3	8.5	0.4	179
657.989	G	14.3	9.1	0.5	179
651.023	B	14.4	6.4	0.2	180
653.988	B	15.7	14.0	0.6	186
654.020	B	15.7	15.2	0.6	187
654.039	B	15.7	16.3	0.5	186
655.866	B		13.2	0.3	182
657.955	B	15.2	10.3	0.5	182
657.991	B	15.1	10.8	0.7	180
651.531	U	15.5	12.2	1.6	177
654.004	U	16.3	16.5	3.5	179
657.939	U	16.0	22.9	4.1	188
657.994	U	16.0	21.3	9.4	183

The most striking feature is a large and fast variability of the degree of polarization. This fast variability is very pronounced in the yellow-ultraviolet spectral region but seems to be absent in the infrared. An extreme example is an increase of the degree polarization by 9 % during only 3 days. Such short time scale of the polarization variability is unprecedented among red variables. It should be noted that the brightness variability is also present with the same time scale and an amplitude of around 1 mag. Smaller variations on a time scale of an hour may be also present but the observations were not accurate enough for establishing it with cenrtainty.

The wavelength dependence shows a minimum in the degree of polarization and a rotation of the position angle by almost 90°. Such features were already observed in other red variables like VY CMa, L_2 Pup and V CVn (Dyck et al. 1971). However in 1968 the wavelength dependence was entirely different. It is demonstrated in the Figure where the present observations obtained in 1972 (filled squares) are compared with 1968 observations (open squares) after Kruszewski (1971). The infrared observations from 1967 (open circles) and from 1971 (filled circles) are also plotted after Dyck et al. (1971).

CIT 6 is relatively bright in the ultraviolet what indicates that either it has CH characteristics ot there is an unresolved hotter component present.

I am indebted to Drs.T. Gehrels and K. Serkowski for arranging the observing run with the University of Arizona telescopes and to Drs.G.P. Kuiper and R.J. Weymann for the permission to use the telescopes.

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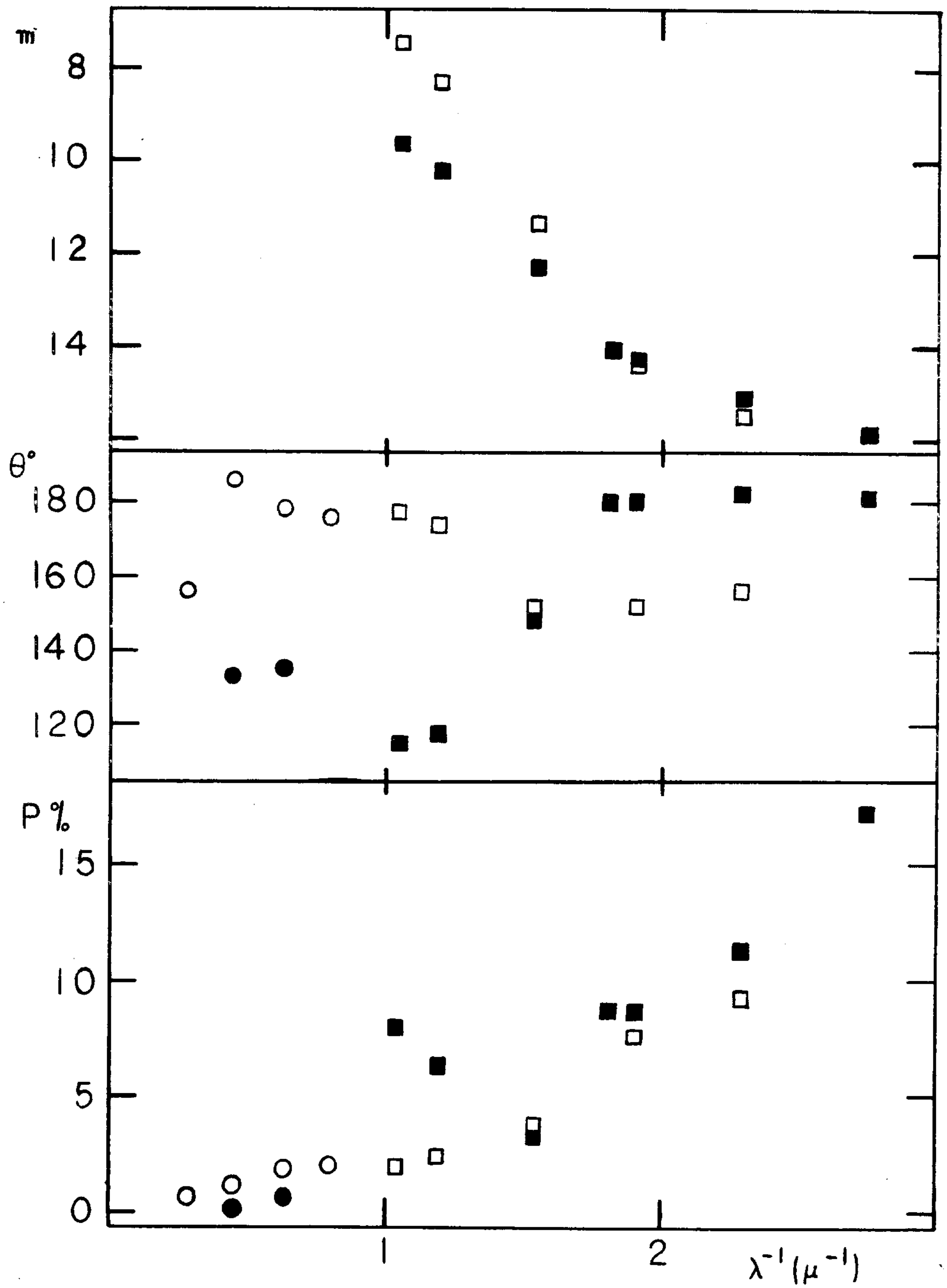
m
8
10
12
14
θ°
180
160
140
120
P %
15
10
5
0
1
2
$\lambda^{-1} (\mu^{-1})$

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NUMBER 782
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ON THE POLARIZATION VARIABILITY OF YY Eri

The polarization feature of YY Eri was observed during 6 nights in October and November of 1971 by means of automatic electronic polarimeter (1) attached to the 16" refractor. No light filters were used. The effective wavelength of the apparatus was equal to 0.54μ. 222 measurements were obtained. The mean values of the polarization depending on the phases are given in Table 1, where the phases f listed in column one, are computed from elements of GCVS 1969. The number of observations is shown in column 2 and the mean values of the polarization parameters P and Θ are given in the last two columns together with the values of their errors, found from dispersion of individual observations. Averaging was performed according to the components P_x and P_y of the polarization vector in a rectangular frame of references.

The polarization turned out to be variable. Figure 1a gives the dependence of the observed polarization degree and of the position angle and figure 1b - the dependence of the quantity of polarization light (2) $P_o = l(f) \cdot P(f)$ and of the position angle on the phase, where $l(f)$ is the light loss, computed from the light curve of YY Eri, published in (3).

Qualitatively the polarization maximum at $0^p.25$ phase may be explained by the scattering of light on gaseous stream emerging from the primary component.

14 February 1973

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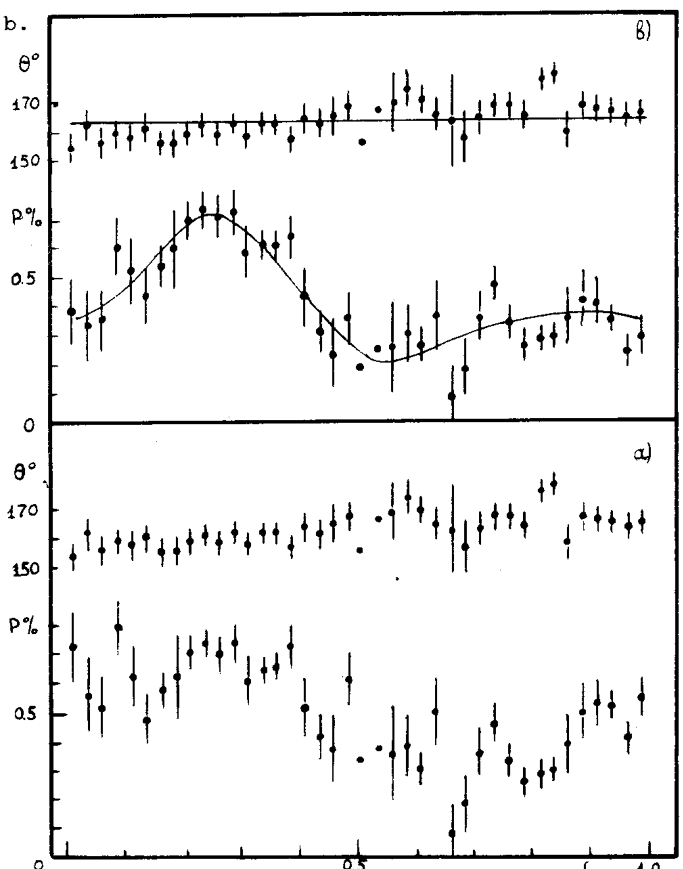
Table 1

f	n	P% ± σ_p		θ ± σ_θ		f	n	P% ± σ_p		θ ± σ_θ	
0.011	9	0.73 ±	0.12	154 ±	4	0.508	1	0.34		156	
0.039	9	0.56	0.12	162	5	0.539	1	0.38		167	
0.063	8	0.52	0.11	156	5	0.564	3	0.36 ±	0.17	169 ±	10
0.088	8	0.80	0.10	159	3	0.587	3	0.39	0.10	174	6
0.113	8	0.63	0.11	158	4	0.612	3	0.31	0.06	170	4
0.138	10	0.48	0.09	161	4	0.638	4	0.51	0.12	165	6
0.164	10	0.58	0.07	156	3	0.665	6	0.09	0.10	163	16
0.189	5	0.62	0.14	156	5	0.688	6	0.19	0.09	157	9
0.213	6	0.71	0.06	159	2	0.713	6	0.37	0.08	164	5
0.238	8	0.74	0.05	162	2	0.737	6	0.47	0.06	168	3
0.263	8	0.70	0.07	159	3	0.763	6	0.34	0.05	168	3
0.289	7	0.74	0.07	162	2	0.787	6	0.27	0.05	165	4
0.313	6	0.61	0.09	158	3	0.817	3	0.30	0.02	177	2
0.339	8	0.65	0.04	162	2	0.839	4	0.31	0.03	179	2
0.363	6	0.66	0.04	162	2	0.863	3	0.40	0.10	159	6
0.390	5	0.73	0.07	157	2	0.889	4	0.51	0.10	168	4
0.413	6	0.52	0.10	164	5	0.913	4	0.54	0.08	167	4
0.439	7	0.42	0.07	162	4	0.938	4	0.53	0.04	166	2
0.463	4	0.38	0.12	165	7	0.966	3	0.42	0.05	164	3
0.489	2	0.62	0.09	168	4	0.988	6	0.56	0.06	166	3

Fig.1a,b.



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A FLARE OF "ANTIFLARE" STAR RZ Psc

RZ Psc is one of the most striking representative of the so-called "antiflare" stars, in which the intervals of relative quiescence ($m_v \sim 11^m.5$) are interrupted by sharp Algol-like minima ($m \sim 1^m.5$). Hoffmeister and Parenago (1,2) considered the star as being an Algol system. However, the later investigations especially by Zessewitsch (3,4) have shown the assumption to be incorrect. RZ Psc turned out to be a rapid irregular variable of spectral class KO (GCVS, III ed.).

The star was observed photoelectrically at minimum light on August 20, 1972. Modern pulse-counting technique with the 20" reflector was used. Three-colour observations reduced in the standard UBV system are listed in the Table. These data are somewhat uncertain due to a correction that must be made for differential extinction.

U.T.	m_v	m_b	m_u	U.T.	m_v	m_b	m_u
23^h20^m	$13^m.03$	$13^m.82$	$13^m.31$	00^h02	$13^m.00$	$13^m.90$	$14^m.52$
30	.03	.87	.74	05	12.98	14.01	.68
37	.09	.73	.29	10	13.12	.09	-
42	.04	.84	14.08	14	12.90	13.91	-
48	.00	.99	.39	19	.86	.93	13.79
55	12.78	.72	12.90	50	13.00	14.04	14.61

When the ordinary three-colour run of observations was over we launched two series of continual measuring through B filter using 15-second integration time. The results are given in the Figure. As the star was badly faint, the mean error was near $0^m.04$ in each instance.

The present flare strongly resembles that of UV Cet. Moreover, one can see from the Table that before the flare U-magnitudes change six times as much as B-ones do, i.e.

$$\frac{\overline{\Delta U}}{\overline{\Delta B}} \simeq 6.0$$

If the ratio $\overline{\Delta U}/\overline{\Delta B}$ within the flare in supposed to be same we can assume that the U-amplitude was about 5^m.

On the basis of the form of the flare and the possibly large U-amplitude we can expect RZ Psc at minimum light to reveal usual features of a flare star.

We would like to express our gratitude to Prof.V.P.Zessewitsch and Dr.V.S. Oskanjan for useful and variable discussion.

Kiev, March 19, 1973

V.G. KARETNIKOV
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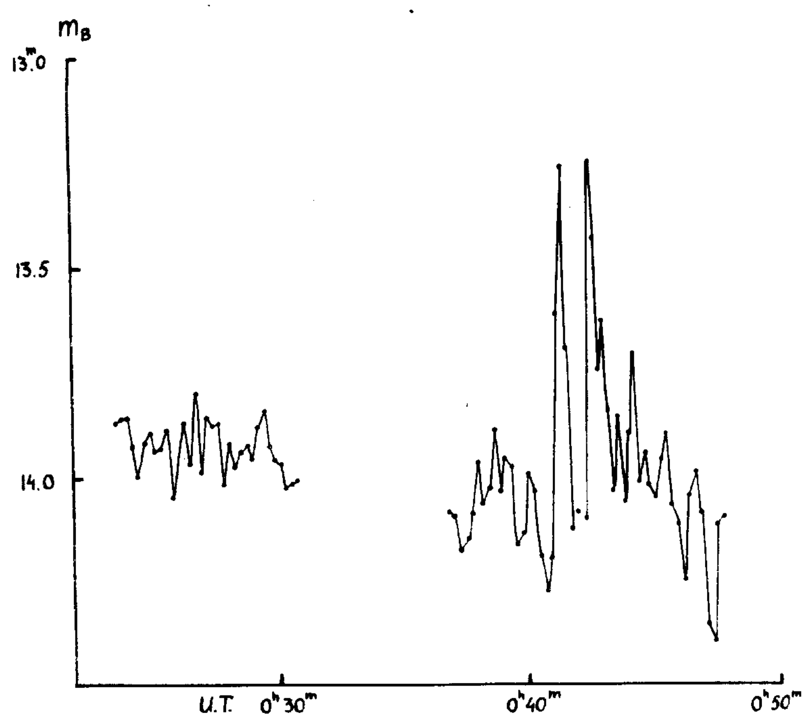


COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 784

Konkoly Observatory
Budapest
1973 April 19

PHOTOELECTRIC OBSERVATIONS OF β ARIETIS

β Arietis has been known as a spectroscopic binary star with a highly eccentric orbit of e=0.892 (Petrie 1938), and it was suspected by Dommanget that it might have light variation due to a periastron effect. The first photoelectric observation was made by Lovell and Hall (1971) for light variation, but they concluded from their fifteen observations that there is no periastron effect larger than about $0^m.01$. In view of rather small number of their observations, we made further BV photoelectric observations in order to check their conclusion. Our observations were made on sixteen nights in 1972-73 with the 8-inch refractor at the Education Centre of Kanagawa Prefecture. In these observations, $\gamma^1+\gamma^2$ Arietis was used as the comparison star, which was the same one as used by Lovell and Hall.

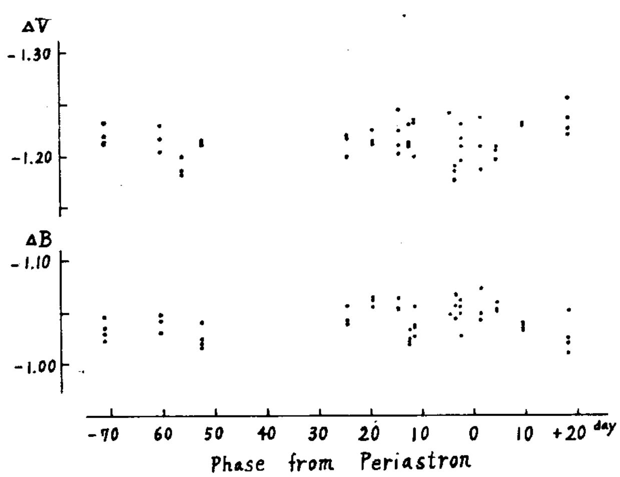
Correcting for differential axtinction, the differential BV standard magnitudes between β Arietis and the comparison were deduced as shown in the following table. In the table, the phases are calculated from periastron with Petrie's elements (1938):

$$\text{Hel JD } 2428010.944 + 106^d.9973 \text{ E.}$$

The standard error of a single differential observation can be estimated from differential brightnesses out of periastron to be $0^m.02 \sim 0^m.03$ for both colours. Unfortunately, owing to unfavourable weather condition, no observation was attained on the night nearest periastron. However, even though we consider such amount of accidental errors of observations, it does not seem that β Arietis has any appreciable light variation of more than $0^m.02$ around the periastron, in agreement with the previous conclusion by Lovell and Hall.

I would like to express my hearty thanks to Prof.M. Kitamura at Tokyo Astronomical Observatory for his suggestion of this programme and kind guidance. Thanks are also due to Dr.J. Dommanget at the Royal Observatory of Belgium for his kind information.

Hel JD 2441000+	ΔV	ΔB	phase	Hel JD 2441000+	ΔV	ΔB	phase
635.0838	-1.215	-1.045	-71.515	694.9140	-1.198	-1.053	-11.684
.0879	1.213	1.022	.511	.9175	1.231	1.035	.681
.0928	1.220	1.030	.506	.9203	1.199	1.037	.678
.0984	1.232	1.034	.500	.9240	1.233	1.026	.674
646.0202	1.229	1.042	-60.578	701.8717	1.225	1.068	-4.727
.0243	1.217	1.048	.574	702.9390	1.175	1.067	-4.659
.0285	1.203	1.030	.570	.9421	1.189	1.043	.656
649.9983	1.182	-	-56.600	.9494	1.174	1.066	.649
650.0021	1.186	-	.596	.9608	1.184	1.056	.638
.0066	1.199	-	.592	703.8891	1.194	1.054	-2.709
653.9441	1.215	1.024	-52.654	.8919	1.208	1.048	.707
.9476	1.213	1.020	.651	.8953	1.216	1.027	.703
.9510	1.212	1.016	.647	.8985	1.229	1.061	.700
.9663	1.199	1.061	.632	707.8992	1.187	1.042	+1.301
681.9059	1.219	1.055	-24.693	.9288	1.235	1.072	.330
.9100	1.217	1.042	.688	.9316	1.207	1.047	.333
.9142	1.199	1.038	.684	710.9052	1.197	1.052	+4.307
686.9086	1.224	1.061	-19.690	.9079	1.209	1.053	.310
.9148	1.213	1.063	.684	.9107	1.196	1.058	.312
.9207	1.200	1.072	.678	.9132	1.205	1.051	.315
691.9091	1.202	1.052	-14.689	715.8878	1.229	1.034	+9.289
.9137	1.210	1.063	.685	.8906	1.229	1.037	.292
.9182	1.223	1.064	.680	.8933	1.228	1.039	.295
.9241	1.244	1.051	.674	.8968	1.231	1.031	.298
693.9054	1.209	1.020	-12.693	724.8906	1.256	1.010	+18.292
.9102	1.212	1.017	.688	.8940	1.227	1.019	.296
.9141	1.208	1.023	.684	.8975	1.221	1.024	.299
.9179	1.229	1.032	.681	.9010	1.236	1.050	.303



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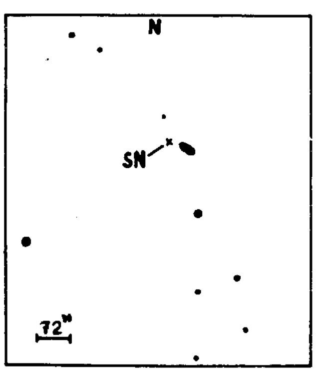
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 785

Konkoly Observatory
Budapest
1973 April 25

SUPERNOVA 1968 IN NGC 4975

A supernova has been discovered by the writer in NGC 4975 (RA=$13^h05^m.4$, D=$-4^\circ45'$,1950) while looking at a photograph taken by M. Lovas on the 23rd April, 1968 with the 600/900/1800 mm Schmidt-telescope of the Konkoly Observatory. It is the same plate on which Lovas has found the supernova 1968i in NGC 4981 (No.215 in Kowal and Sargent's list, AJ 76, 756, 1971). Thus, for the first time two supernovae were discovered on just the same plate.



The supernova is 36"N and 12"E of the centre of NGC 4975 as shown in the Figure. Its brightness was of magnitude 15 on 23rd April, 1968. It was definitely fainter on a plate taken two days later.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1973 April 30

PHOTOGRAPHIC OBSERVATIONS OF ECLIPSING VARIABLES

Var.	Min.helioc. J.D. 244...	n	$O-C_M$	$O-C_K$
RT And[1]	1605.412	8	$-0^d.007$	$-0^d.006$
	1717.372	9	+0.003	+0.004
WY Cnc	1765.4225	10	-0.0018	-0.0082
AB Cas	1570.390	10	+0.007	+0.022
ZZ Cyg	1596.396	9	-0.031	-0.016
	1601.425	8	-0.031	-0.016
BR Cyg	1595.415	13	-0.008	-0.008
TY Del	1594.407	10	-0.007	+0.008
UV Leo	1766.401	11	0.000	+0.012
	1772.403	11	+0.001	+0.013
ET Ori	1741.398	16	+0.001	+0.001
RT Per	1597.402	12	-0.051	-0.030
X Tri	1593.371	13	-0.025	-0.022
AW Vul	1602.4035	9	-0.0145	-0.0117
BE Vul	1573.406	10	+0.010	+0.001

[1] Last plate (.453) disturbed by clouds. C_M from GCVS 1969/70, C_K from SAC 44 (1973). n= number of plates. Each plate has been observed in four positions, each turned 90°.

RR Lyr-star	Max.helioc.	n	$O-C_M$	$O-C_K$
S Com	1395.504	13	$-0^d.025$	$-0^d.014$

New elements and 3 earlier maxima give the following epochs and O-C: Max.= J.D. $2438851.480 + 0^d.5865852 \cdot E$;

Obs.max.	38851.482	n= 8	Ep.= 0	O-C= $+0^d.002$
	39918.477	14	1819	-0.001
	41063.488	10	3771	-0.005
	41395.504	13	4337	+0.004

P. AHNERT
Sonneberg

INSTANTANEOUS ELEMENTS OF 4 ECLIPSING STARS

AB CASSIOPEIAE

(I) Min.= J.D. 2425404.419 + $1^{d}\!.366851 \cdot E$; $\sigma = \pm 0^{d}\!.006$
T = J.D. 2425404 to 2426693 ; n=12

(II) Min.= J.D. 2432673.391 + $1^{d}\!.3668729 \cdot E$; $\sigma = \pm 0^{d}\!.0037$
T = J.D. 2432673 to 2436540 ; n=44

(III) Min.= J.D. 2436868.325 + $1^{d}\!.3668813 \cdot E$; $\sigma = \pm 0^{d}\!.0038$
T = J.D. 2436868 to 2441570 ; n=72

(Mean min.=J.D.2425404.388 + $1^{d}\!.3668708 \cdot E$; $\sigma = \pm 0^{d}\!.015$)

ZZ CYGNI

(I) Min.= J.D. 2417442.419 + $0^{d}\!.6286185 \cdot E$; $\sigma = \pm 0^{d}\!.0033$
T = J.D. 2417442 to 2425763 ; n=42

(II) Min.= J.D. 2427955.422 + $0^{d}\!.6286167 \cdot E$; $\sigma = \pm 0^{d}\!.0026$
T = J.D. 2427955 to 2435240 ; n=25

(III) Min.= J.D. 2438920 to 2441601 ; $\sigma = \pm 0^{d}\!.0021$
T = J.D. 2438920 to 2441601 ; n=22

(Mean min.=J.D.2415020.372 + $0^{d}\!.6286167$; $\sigma = \pm 0^{d}\!.0065$)

AB VULPECULAE

(I) Min.= J.D. 2426319.342 + $0^{d}\!.8064522 \cdot E$; $\sigma = \pm 0^{d}\!.0029$
T = J.D. 2426319 to 2437940 ; n=26

(II) Min.= J.D. 2439376.598 + $0^{d}\!.8064498 \cdot E$; $\sigma = \pm 0^{d}\!.0030$
T = J.D. 2439376 to 2441602 ; n=6

(Mean min.=J.D.2426319.342 + $0^{d}\!.8064512 \cdot E$; $\sigma = \pm 0^{d}\!.0064$)

BO VULPECULAE

(I) Min.= J.D. 2432379.773 + $1^{d}\!.945910 \cdot E$; $\sigma = \pm 0^{d}\!.0069$
T = J.D. 2432379 to 2435742 ; n=17

(II) Min.= J.D. 2435989.431 + $1^{d}\!.945866 \cdot E$; $\sigma = \pm 0^{d}\!.0019$
T = J.D. 2435989 to 2441276 ; n=15

Mean elements of BO Vul are unfit. The large scattering of the minima computed by (I) is caused by the method of Ashbrook (n=12), who has set single photographic observations into the mean light-curve of Nassau.

σ is the scattering (m.e.) of the observed minima, T is the time-interval, for which the instantaneous elements are valid and n is the number of minima used for the calculation. Mean elements have been given in parentheses.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 787

Konkoly Observatory
Budapest
1973 May 2

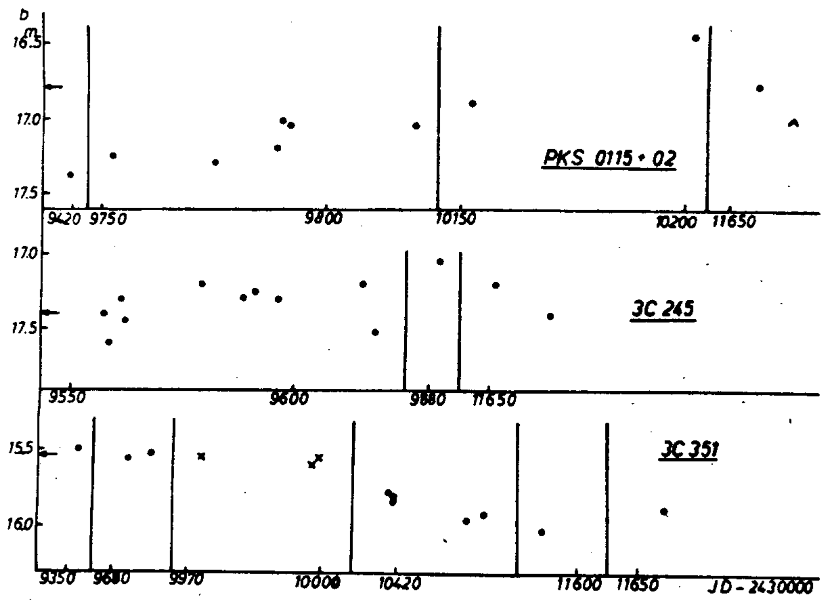
OPTICAL BEHAVIOUR OF FOUR QUASI-STELLAR OBJECTS

Four quasi-stellar objects are within the fields frequently observed at the 60/90 cm Schmidt telescope of Jena University Observatory in the course of the search for supernovae.
The objects are PKS 0106+01, PKS 0115+02, 3 C 245, and 3 C 351, the period covered 1966 September to 1972 November. The plates were taken in the instrumental b-colour (ORWO ZU 2 + GG 13,2 mm), which matches the B-colour of the UBV system. Photometric scales were determined from the diameters of stellar images on the prints of the Palomar Observatory Sky Survey (POSS) as was described by Dorschner et al. In the present case an individual relation between magnitude and diameter had been set up, however.These scales were supplemented by photographic transfer of a neighbouring standard field (3C245) and by a standard sequence within the field after Angione (3C351). In both cases the accordance was satisfactory. In the following the results of the long-term behaviour are summarized.

PKS 0106+01: Only seven plates are available. With one exception the magnitudes scatter around $b=17^{m}.6$, a figure which has been determined on the POSS (JD=243 5046.1), too. For 1967 October 28 (JD==243 9792.4) the measurement gives $b=18^{m}.25$.It should be noted that Bolton et al. report $B=18^{m}.54$ for 1965 February 14 (JD= 243 8806). The object may be variable, therefore.

PKS 0115+02: The observations give a steadily rising brightness from about $b=17^{m}.3$ to $16^{m}.6$. For there is only one plate nothing can be said on the reality of the decline shown at the end of the period. The last value (Λ in the Figure) is a lower limit. From the diameter on the POSS (JD=243 5046.1) $b=16^{m}.80$ results. As for the following two objects the POSS-magnitude is indicated by an arrow at the vertical scale of the Figure.

3 C 245: Over the period covered the object shows no definite light variation. A brightening indicated on 1969 January 27 (JD=243 9882.5) rests on one plate only. The magnitude determined from the POSS (JD==243 3681.2) is in accordance with the present results.Photoelectric



measurements by Ryle and Sandage show the object to be somewhat fainter (B=17.75 on JD=243 8375). It cannot be excluded that part of this difference comes from a systematic error in our photometric scale. The agreement with the photoelectric sequence in the case of 3 C 351 points out, however, that the systematic error should be small and the possibility of a real variation in brightness remains.

3 C 351: Up to 1967 July, including the POSS (JD=243 5225.3), the object appears to be equal magnitude (about $b=15\overset{m}{.}5$). In 1969 July a decrease in brightness is indicated and the last two plates give about $b=16\overset{m}{.}0$. The photoelectric sequence by Angione is in good agreement with the results from the POSS diameters. This author's observations (crosses in the Figure) fix 1968 June as the earliest epoch for the begin of the decline in brightness. From photographic plate collections Penston and Cannon detected an irregular variability between JD 243 9294 and 243 9771.

When the present manuscript was finished, the publication by Lü came to the author's knowledge, showing the same optical behaviour of 3 C 351.

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INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1973 May 2

NEW FLARE STARS IN THE PLEIADES REGION (1972 - 1973)

During the months of October, November and December, 1972, and January and February, 1973, we obtained 180 ultraviolet multiple exposure plates centered in Alcyone. The number of different exposures were 1,054 and the total time of effective observation 225^h10^m. In this photographic material we detected 124 outbursts in different stars. Table 1 summarizes our results but only comprises the 21 new flare stars found. The many flare-up repetitions in the previously known flare stars are not included. The numbering of the new flare stars is the continuation of the serial numbers used by Haro and González, (1972) and Haro and Chavira (1972). The coordinates and U magnitudes given are approximate.

As can be noticed from Table 1 the brightest new flare stars are $H_{II}2244$, $H_{II}1883$ and $H_{II}1100$, which have visual magnitudes during minima equal to 12.67, 12.60 and 12.16, respectively, according to the Johnson and Mitchell (1958) photoelectric photometry.

Star $H_{II}1100$, according to Wilson (1963) , shows a K3Ve spectral type. If we consider that Kraft and Greenstein (1969) classified the Pleiades stars $H_{II}740$, $H_{II}2588$ and $H_{II}2908$ as having K3Ve spactral types, we find an extremely large magnitude and color dispersion amongst these Pleiades star members. This can be interpreted either as the result of a) Possible discrepancies in the spectral classification criteria used by Wilson and by Kraft and Greenstein; b) Errors in the Johnson and Mitchell photometry larger than the one recognized before (Iriarte 1967); c) Real intrinsic differences amongst these Pleiades stars due to stellar evolution effects. We are inclined to give more weight to this last supposition.

April 13, 1973

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TABLE 1

New Flare Stars in the Pleiades Region (1972-1973)

N°	Star	R.A. (1900)	Dec. (1900)	Mag.in U (Minimum)	$\Delta m U$	Date of Flare-up
35b		3h34m1	+24°28'	19.8	3.3	2 Oct. 1972
36b		3 34.8	22 55	19.4	2.8	7 Jan. 1973
37b		3 37.3	24 03	17.0	0.4	6 Nov. 1972
38b		3 37.6	25 17	19.0	3.0	6 Oct. 1972
39b	HII 133	3 37.6	24 05	17.0	0.8	7 Jan. 1973
40b		3 38.1	25 21	14.8	2.8	4 Oct. 1972
41b		3 38.4	24 33	19.6	5.6	2 Jan. 1973
42b		3 38.4	24 28	17.2	3.7	9 Jan. 1973
43b	HII 1100	3 40.6	24 02	14.46	0.6	3 Feb. 1973
44b	HII 1114	3 40.7	24 38	16.6	0.8	13 Nov. 1972
45b	HII 1355	3 41.3	23 43	16.5	1.2	11 Nov. 1972
46b		3 41.9	22 32	∿21.0	∿6.0	26 Jan. 1973
47b		3 42.2	23 25	19.4	3.9	26 Jan. 1973
48b	HII 1883	3 42.5	22 59	14.37	2.1	11 Nov. 1972
49b		3 42.6	22 33	>22.0	>6.7	7 Dec. 1972
50b		3 43.3	25 23	19.0	5.0	7 Nov. 1972
51b	HII 2244	3 43.4	24 28	14.33	1.7	6 Feb. 1973
52b		3 43.6	23 36	19.1	4.0	6 Dec. 1972
53b		3 44.1	24 18	∿22.0	∿7.3	2 Oct. 1972
54b		3 44.4	21 52	17.3	3.3	6 Feb. 1973
55b	HII 3063	3h45m5	+23°36'	15.7	1.0	6 Nov. 1972

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1) Haro, G. and Gonzales, G., 1972, IAU Information Bulletin on Variable Stars No. 715.

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INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1973 May 9

"Rosemary Hill Observatory, Department of Physics and Astronomy, University of Florida, Gainesville, Florida Contribution No.15."

MINIMA OF 44i BOOTIS

Photoelectric BV observations of the eclipsing binary, 44i Bootis, were taken with the photometer attached to the 30-inch (76 cm) reflector of the Rosemary Hill Observatory during the years 1969-71. The heliocentric times of minimum light (averages of the values obtained with the blue and yellow filters) are as follows:

Hel JD 2400000 +	E	O - C
40339.6493	6819	+0.0070
346.6161	6845	+0.0106
346.7482	6845.5	+0.0088
392.5449	7016.5	+0.0093
392.6820	7017	+0.0125
714.5891	8219	+0.0068
714.7299	8219.5	+0.0137
769.6286	8424.5	+0.0104
769.7628	8425	+0.0107
1102.6556	9668	+0.0103

The epochs (E's) and (O - C)'s were calculated using the light elements given by Pohl (A.N. 291, 111, 1969):

Primary minimum = JD 2438573.4166 + $0\overset{d}{.}26781430$ E

The (O - C)'s confirm that the period of 44i Bootis has increased as Scarfe and Brimacombe (A.J. 76, 50, 1971) and Bergeat, et al. (Astron. and Astrophys. 17, 215 1972) have previously reported.

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Konkoly Observatory
Budapest
1973 May 9

AD LEO

The photoelectric monitoring of the flare star AD Leo was carried out at the Okayama Station during the period of 27 January to 21 March 1973. The observations were made with the simultaneous three-color photometer attached to the 91 cm reflector. The observational results are summarized in the Table.

Tokyo Astronomical Observatory
April 10, 1973.

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K. ICHIMURA
Y. SHIMIZU
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M. YUTANI
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Flares of AD Leo observed at Okayama,

27 to 31 January and 8 to 21 March 1973.

Date 1973	Time of Monitoring (UT)	Filter	Time of Max (UT)	Flares $\frac{I_{0+f}-I_0}{I_0}$	Max. Δm mag	P	d_b min	d_a min	σ	Weather
Jan. 27^d	12^h23^m - 14^h35^m	U		7.69	2.35		0.9	>15.8		
		B	$15^h23^m.2$	0.98	0.75		0.7	>15.8		
		V		0.25	0.25	U>27.2^{min}	0.7	>15.8		
						B> 3.9				1~4
		U		3.07	1.53	V> 1.2	-		U 0.12^{mag}	
	14 57 - 15 39	B	15 26.2	0.46	0.41		-		B 0.04	
		V		0.13	0.14		-		V 0.02	
	16 30 - 18 23	U		1.34	0.92	>2.7	1.7	>5.4		3
		B	18 04.1	0.22	0.21	>0.2	1.7	>5.4		
		V	-	-	-	-	-	-		
28	13 37 - 15 07									
	15 52 - 19 55	U	19 28.1	1.87	1.11	>1.40	0.8	>2.2	0.14	4
		B		0.17	0.20	>0.10	0.4	>0.8	0.05	
		V	-	-	-	-	-	-	0.02	
29	11 35 - 12 24									
	12 30 - 12 53									
30	12 05 - 19 17	U	15 22.5	0.30	0.28	0.21	0.4	2.1	0.10	1
		B		0.04	0.04	0.03	0.2	1.8	0.03	
		V	-	-	-	-	-	-	0.02	
31	12 08 - 19 53	U		0.65	0.54	0.77	0.6	4.1	0.11	
		B	17 02.6	0.10	0.10	0.11	0.6	3.2	0.03	0
		V		0.03	0.03	0.04	0.4	2.4	0.02	
Mar. 8	11 00 - 16 43	U		0.73	0.60	1.00	0.7	5.1	0.10	
		B	13 51.7	0.18	0.18	0.25	1.1	5.7	0.03	1
		V		0.03	0.03	0.03	0.8	1.4	0.01	
		U		0.95	0.73	1.21	0.4	5.0	0.12	
		B	16 05.5	0.11	0.11	0.08	0.3	3.7	0.04	1
		V		0.04	0.04	0.04	0.4	1.8	0.02	
		U		3.80	1.70	>5.47	1.1	>2.6	0.13	
		B	16 40.4	0.70	0.58	>0.64	0.9	>2.4	0.03	3~4
		V		0.12	0.12	>0.05	0.5	>0.7	0.02	
10	10 40 - 18 13	U		0.51	0.45	1.94	1.2	5.3	0.20	
		B	12 05.6	0.06	0.06	0.18	0.6	5.0	0.04	2
		V		0.03	0.03	0.16	1.4	5.0	0.03	
		U		0.50	0.44	0.39	0.2	2.3	0.12	
		B	15 13.1	0.08	0.08	0.08	0.2	1.9	0.04	1
		V	-	-	-	-	-	-	0.02	
18	10 46 - 14 31	U	13 33.2	1.12	0.82	0.30	0.2	0.4	0.44	1
		B		0.21	0.21	0.04	0.2	0.2	0.08	
		V	-	-	-	-	-	-	0.02	
19	11 44 - 18 39									
21	10 32 - 11 18	U	11 03.8	0.85	0.67	0.58	0.2	2.0	0.16	1
		B		0.08	0.08	0.03	0.3	0.5	0.04	
		V	-	-	-	-	-	-	0.02	
	12 58 - 18 00	U	13 18.3	0.85	0.67	0.25	0.2	0.7		
		B		0.09	0.09	0.06	0.2	0.7		1
		V	-	-	-	-	-	-	0.42	
									0.06	
		U	16 33.1	0.58	0.50	0.20	0.4	0.6	0.02	
		B		0.14	0.14	0.03	0.3	0.4		1
		V	-	-	-	-	-	-		

Weather; 0= very clear, 1= clear, 2= some thin clouds, 4= some clouds.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 791

Konkoly Observatory
Budapest
1973 May 21

CONTINUOUS PHOTOELECTRIC PHOTOMETRY OF AD LEO DURING THE 1973 INTERNATIONAL PATROL

The flare star AD Leo was observed photoelectrically with the 30cm Cassegrain reflector at Oslo Solar Observatory ($\lambda = 0^h43^m02^s$, $\phi = +60^o12'30''$, h= 585 m) which is operated by the Institute of Theoretical Astrophysics, University of Oslo. The observing session lasted January 27 - February 9, 1973, according to the program of the IAU Working Group on Flare Stars (1). The monitoring was performed with a filter combination (1 mm Schott BG 12 + 2 mm Schott GG 385) which gives a bandpass equal to the B-band in Johnson's photometric system. The applied diaphragm has a diameter of 1 mm, corresponding to a field of 57.8 seconds of arc. The observations in intervals 4 and 5 on February 8 were performed with a 1/2 mm diaphragm (28.9 seconds of arc). The photomultiplier is a RCA 1P21, working at air temperature. All nigths except February 2-3 the air temperature was well below 0^oC, and it never changed more than 2^oC during a night.

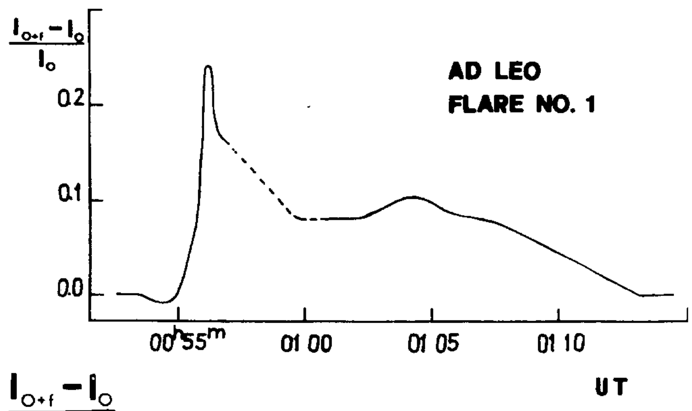
Using a paper speed equal to 240 cm/hour, the time resolution on the recording paper is better than the time constant of the equipment, which is 1 second. The photometer system is described by Sivertsen (2).

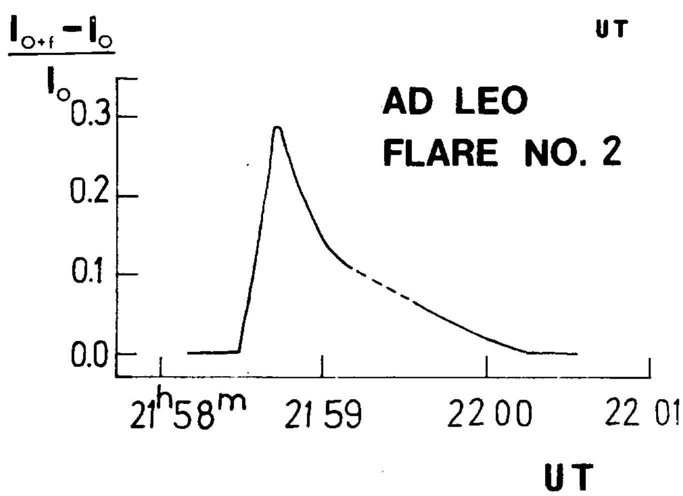
A detailed presentation of the monitoring intervals is found in Table 1, noting all interruptions exceeding 1 minute. The last column contains weighted mean values with respect to time of σ/I_o. A total coverage of 20.8 hours resulted in 2 observed flares, the physical characteristics of which are presented in Table 2, according to Andrews et. al. (3).

U-band (2mm Schott UG 2) observations of flare no.1 4^m20^s after maximum give $\Delta m(u) = 0.7 \pm 0.2$ magnitudes, compared to $\Delta m(b) = 0.09$ magnitudes 15 seconds earlier.

Flare no. 2 was observed in the B-band only. This flare should be recorded as "suspected". Some minutes after the flare had ended we discovered that the recorder pen was out of position, and this could have caused a spurious flare. However, there are no unusual recording preceding the flare.

For flare no. 1 the points of the rising and declining branch of the light curve was determined by taking 15 seconds and 60 seconds means of the intensity, respectively. For flare no.2 both rising and declining branch was constructed from 5 seconds means. As light curve was taken the best fit to the points, and the smoothed curves are presented in the figures.





We thank observator R. Brahde for giving us the opportunity to use the equipment at the observatory.

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Oslo, May 14, 1973.

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B. N. ANDERSEN

Table 1

Monitoring Intervals

Date 1973	Monitoring Intervals UT	Monitoring Time	$<\sigma/I_o>$
Jan. 27	18^h45^m- 19^h05^m,19 11 - 19 23,22 36 - 23 14, 23 17 - 23 27 ,23 31 - 24 00.	1^h49^m	0.10
28	00 00 - 00 57 ,01 00 - 01 15,01 20 - 01 28, 01 31 - 02 19 ,02 24 - 03 44,03 48 - 03 58, 04 01 - 04 10 ,04 12 - 04 21,04 25 - 04 54, 05 00 - 05 21 ,05 23 - 05 43,05 43 - 05 51, 05 52 - 05 59 .	5 21	0.09
Feb. 2	21 30 - 21 43 ,21 46 - 22 13,22 27 - 22 36, 22 38 - 22 55 ,22 57 - 23 00,23 04 - 23 10, 23 12 - 23 25 ,23 36 - 23 49,23 54 - 24 00.	1 47	0.10
3	00 04 - 01 12 ,01 17 - 02 02,02 52 - 03 08.	2 09	0.08
4	18 19 - 18 28 ,18 31 - 18 42,18 45 - 18 56, 18 58 - 19 00 ,21 37 - 21 43,21 45 - 21 51, 21 53 - 22 00 ,22 02 - 22 23,22 27 - 22 50, 22 52 - 23 35 ,23 37 - 24 00.	2 09	0.07
5	00 00 - 00 08 ,00 10 - 01 08.	1 06	0.08
7	23 21 - 23 25 ,23 26 - 23 31,23 36 - 24 00.	33	0.08
8	00 00 - 00 16 ,00 18 - 00 28,01 22 - 01 49, 01 52 - 02 00 ,02 12 - 02 23,02 27 - 04 03, 04 17 - 05 00 ,05 02 - 05 25,05 27 - 05 30, 05 31 - 05 33 .	3 59	0.06
9	18 00 - 18 21 ,18 55 - 19 09,19 12 - 19 14, 19 27 - 19 41 ,19 50 - 20 20.	1 21	0.14

Total coverage: 20^h47^m

Table 2

Physical Characteristics of the Observed Flares

Flare No.	Date 1973	t_{max} UT	Duration τ_b	Duration τ_a	Maximum Intensity $\frac{I_{o+f}-I_o}{I_o}$	Maximum Intensity $\Delta m(b)$ (mag.)	Stand. dev. $\sigma(b)$	Equiv. Energy P (min.)	Air mass X
1	Jan.28	$00^h56^m10^s$	1^m21^s	18^m50^s	0.24	0.21	0.07	1.45	1.31
2	Feb. 2	21 58 45	15	1 30	0.29	0.28	0.08	0.15	1.43

References:

(1) Chugainov, P.F. Comm.27 IAU, I.B.V.S. No. 744, 1972.
(2) Sivertsen, S. Institute of Theoretical Astrophysics, Blindern-Oslo. Report No. 34, 1972.
(3) Andrews, A.D., Chugainov, P.F., Gershberg, R.E., and Oskanian, V.S. Comm. 27 IAU, I.B.V.S. No.326, 1969.

ERRATA TO I.B.V.S. No.723.

The UT times for EV Lac flare no.2 presented in I.B.V.S. no.723 are 5 minutes wrong. The time interval on the light curve should run from 24^h47^m to 49^m. In table 2 the time of maximum, Max UT, should be $21^h46^m.5$.

B.N. ANDERSEN, B.R. PETTERSEN

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 792

Konkoly Observatory
Budapest
1973 May 22

FIRST EPHEMERIDES OF FIVE VARIABLE STARS IN ERIDANUS AND FORNAX

The variable stars discussed in the present paper were discovered by Mrs De Lannoy on plates taken with the 10" Metcalf telescope of the Boyden Observatory.

Charts on which the variables and their comparison stars have been marked are given in Figure 1. They represent a field of approximately 30′×30′ around each variable. North is always at the top. Variable 4 is identical with BT Eridani (CPD -39° 325), no chart is given.

Table 1 gives a synopsis of our investigation. The brightnesses of the comparison stars are given in Table 2. They are derived from star-counts, made in a field of $\frac{1}{4}\,\square^{\circ}$ around each variable, and compared with the tables in Groningen Publication no.43. The brightness of the comparison stars for the variable BT Eridani, however, was taken from the Cape Photographic Durchmusterung.

Details of the least-squares solutions, performed by an electronic computer of the Computing Centre at the University of Louvain, following a program established by Messrs. Goossens and Vissenberg, have been collected in Table 3. Data about the normal points of the mean light-curves are to be found in Table 4.

Phase have always been computed with the formula

$$\text{phase} = P^{-1}(\text{J.D.Hel.} - 2436000).$$

The normal points of the light curves are moreover represented graphically in the diagrams 1 to 5.

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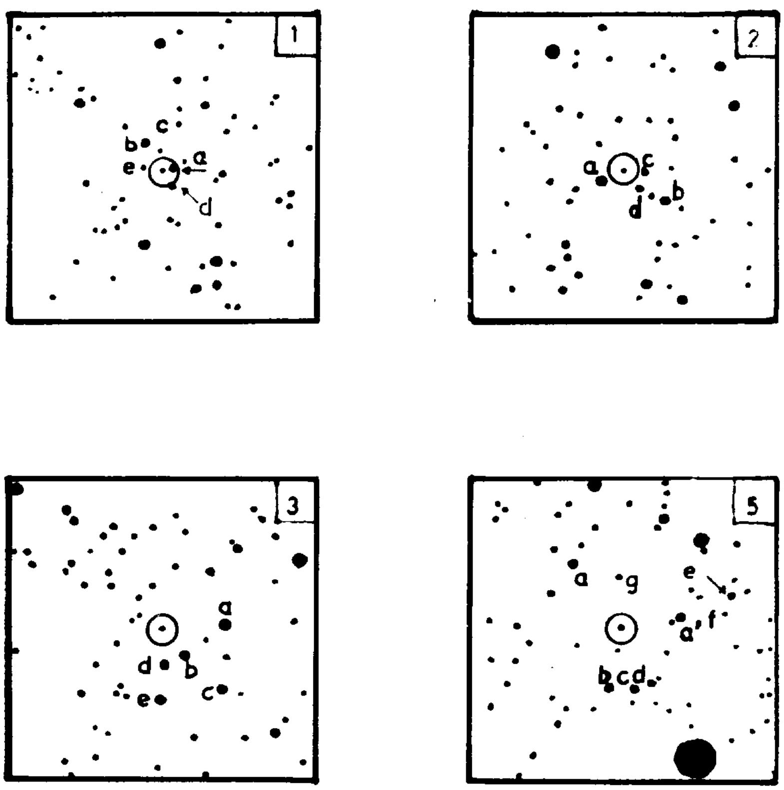
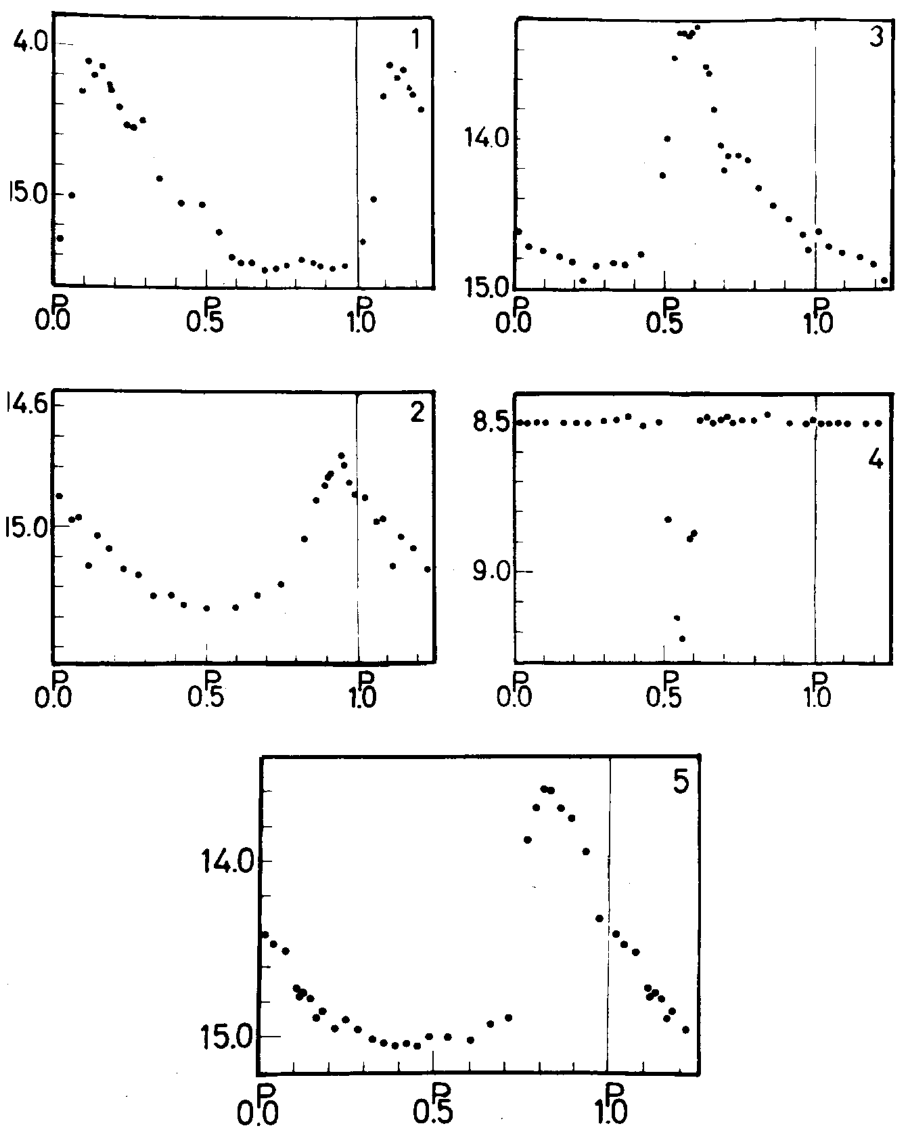


Fig. 1



1
4.0
15.0
P
0.0
P
0.5
P
1.0
3
14.0
15.0
2
14.6
15.0
4
8.5
9.0
5
14.0
15.0

TABLE 1

*	R.A.(1875)	Dec.(1875)	Type	Period	m.e.	Epoch J.D. 2438...	m.e. of single epoch	phase of epoch	n of ep.	Brightness max.	Brightness min.	n of esti
1	$3^h16^m42^s.4$	$-36^\circ12'.4$	RR	$0^d.4712517$	±17	$401^d.566$	$\pm^d.012$	$^p.143$	14	$14^m.10$	$15^m.47$	207
2	3 29 21.8	-40 02.9	RR	0.3932027	±54	401.261	±.021	.929	11	14.76	15.27	175
3	3 31 51.9	-31 40.3	RR	0.4077471	±14	401.462	±.014	.587	23	13.28	14.95	240
4	3 32 09.4	-39 47.8	RR	2.112299	±64	400.741	±.061	.553	7	8.48	9.22	235
5	3 37 42.8	-32 07.9	RR	0.4791230	±25	401.279	±.018	.821	15	13.59	15.05	230

TABLE 2

Comparison Stars

Var.1 *	Var.1	Var.2 *	Var.2	Var.3 *	Var.3	Var.4 *	Var.4 C.P.D. No.	Var.4	Var.5 *	Var.5
a	$13^m.71$	a	$14^m.37$	a	$12^m.61$	a	-40° 330	$8^m.2$	a'	$13^m.14$
b	14.20	b	14.78	b	13.57	b	-39° 321	8.6	a	13.57
c	14.89	c	15.05	c	14.40	c	-39° 320	9.5	b	13.75
d	15.41	d	15.32	d	14.69				c	13.88
e	15.52			e	14.94				d	14.46
									e	14.50
									f	14.69
									g	15.17

TABLE 3

J.D. max.	t	O – C
Var 1		
d		d
2437 223.4248	0	-0.0119
255.4618	68	-0.0201
291.3037	144	+0.0068
634.3628	872	-0.0054
635.3146	874	+0.0039
668.3157	944	+0.0174
693.2827	997	+0.0081
2438 261.5961	2203	-0.0082
262.5680	2205	+0.0212
2439 056.5948	3890	-0.0122
066.4980	3911	-0.0030
094.3118	3970	+0.0061
118.3399	4021	+0.0000
2440 124.4589	6156	-0.0030

J.D. max.	t	O – C
Var 2		
2437 142.5991	0	-0.0202
291.2928	378	+0.0429
577.4887	1106	-0.0127
588.5107	1134	-0.0004
605.4338	1177	+0.0150
633.3465	1248	+0.0103
688.3479	1388	-0.0367
2438 263.6399	2851	-0.0003
265.5991	2856	-0.0071
267.5716	2861	-0.0007
798.4058	4211	+0.0107

J.D. max.	t	O – C
Var 3		
2437 221.4580	0	+0.0159
234.5025	32	+0.0125
252.4145	76	-0.0164
254.4600	81	-0.0096
281.3675	147	-0.0134
581.4966	883	+0.0138
588.4249	900	+0.0104
603.4807	937	-0.0205
635.3039	1015	-0.0016
668.3372	1096	+0.0043

J.D. max.	t	O – C
Var 3 (cont)		
2437 688.2993	1145	-0.0133
2438 261.6066	2551	+0.0016
263.6400	2556	-0.0038
268.5446	2568	+0.0079
760.2849	3774	+0.0061
995.5790	4351	+0.0290
2439 006.5440	4378	-0.0153
055.4627	4498	-0.0259
066.5098	4525	+0.0106
089.3405	4581	+0.0092
093.4289	4591	+0.0198
798.3951	6320	-0.0092
2440 178.4116	7252	-0.0137

J.D. min.	t	O – C
Var 4		
2437 604.4582	0	+0.0538
2438 265.6095	313	+0.0555
267.5819	314	-0.0843
2439 055.5013	687	-0.0519
089.3405	703	-0.0091
091.4477	704	-0.0153
2440 143.4392	1202	+0.0519

J.D. max.	t	O – C
Var 5		
2437 142.5989	0	-0.0237
286.3489	300	-0.0106
581.4966	916	-0.0026
604.5032	964	+0.0061
605.4543	966	-0.0011
632.2932	1022	+0.0070
689.2857	1141	-0.0162
691.2707	1145	+0.0523
2438 267.5923	2348	-0.0111
268.5654	2350	-0.0038
2439 051.4543	3984	+0.0061
088.3329	4061	-0.0091
468.2991	4854	+0.0137
798.3950	5543	-0.0061
821.3887	5591	-0.0107

TABLE 4

n	phase	m	n	phase	m	n	phase	m
	Var 1			Var 2 (cont)			Var 4 (cont)	
	p	m						
5	.021	15.29	5	.952	14.79	5	.481	8.50
5	.058	15.00	5	.972	14.85	5	.501	8.82
5	.091	14.30	5	.991	14.89	5	.542	9.15
5	.112	14.10				5	.561	9.22
5	.137	14.19		Var 3		5	.580	8.89
5	.153	14.13				5	.597	8.87
5	.176	14.25	10	.011	14.61	10	.616	8.50
5	.187	14.30	10	.046	14.72	5	.640	8.48
5	.212	14.40	10	.098	14.76	5	.656	8.50
5	.237	14.52	10	.146	14.79	5	.684	8.49
5	.261	14.53	10	.190	14.82	5	.704	8.48
5	.289	14.48	10	.227	14.95	10	.727	8.50
10	.343	14.87	10	.269	14.85	10	.755	8.49
10	.417	15.13	10	.322	14.83	10	.799	8.49
10	.484	15.14	10	.364	14.84	10	.840	8.47
10	.538	15.23	10	.421	14.77	10	.915	8.50
10	.580	15.39	10	.492	14.24	10	.970	8.50
10	.612	15.43	5	.507	13.99	5	.992	8.49
10	.647	15.43	5	.530	13.44			
10	.689	15.48	5	.546	13.27		Var 5	
10	.729	15.47	5	.562	13.27			
10	.765	15.45	5	.580	13.29	5	.018	14.41
10	.814	15.41	5	.590	13.27	5	.039	14.47
10	.853	15.43	5	.606	13.23	5	.072	14.51
10	.887	15.45	5	.635	13.50	5	.103	14.72
10	.923	15.47	5	.646	13.55	5	.114	14.76
7	.957	15.45	5	.661	13.79	5	.126	14.75
			5	.685	14.03	5	.146	14.78
	Var 2		5	.693	14.20	5	.160	14.89
			5	.708	14.10	10	.180	14.85
5	.021	14.90	10	.743	14.10	10	.212	14.95
5	.057	14.98	10	.775	14.13	10	.246	14.90
5	.083	14.97	10	.809	14.32	10	.280	14.96
5	.116	15.13	10	.858	14.44	10	.320	15.01
5	.143	15.03	10	.908	14.53	10	.352	15.03
10	.183	15.07	10	.957	14.64	10	.384	15.05
10	.231	15.14	5	.975	14.74	10	.420	15.03
10	.277	15.16				10	.449	15.05
10	.328	15.23		Var 4		10	.486	15.00
10	.382	15.23				10	.540	15.00
10	.423	15.26	10	.017	8.50	10	.602	15.02
10	.500	15.27	10	.045	8.50	10	.660	14.93
10	.596	15.27	10	.077	8.50	10	.711	14.90
10	.665	15.23	10	.103	8.50	5	.760	13.88
10	.745	15.19	10	.166	8.50	5	.784	13.69
10	.822	15.04	10	.209	8.50	5	.807	13.59
5	.857	14.91	10	.246	8.50	5	.826	13.60
5	.887	14.86	10	.299	8.49	5	.854	13.69
5	.900	14.83	10	.341	8.49	5	.885	13.75
5	.909	14.82	10	.379	8.48	10	.934	13.94
5	.933	14.76	10	.428	8.51	10	.969	14.32

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NUMBER 793

Konkoly Observatory
Budapest
1973 May 24

PROVISIONAL EPHEMERIDES OF 21 VARIABLE STARS IN A FIELD CENTERED AT $\alpha = 13^h$ $\delta = -70^o$

The 21 variable stars discussed here were discovered in the blink mecroscope of the Astronomical Institute of Louvain on plates taken with the 10-inch Metcalf telescope of the Boyden Observatory at Bloemfontein.

Figure 1 shows the environment of each variable and the comparison stars used. The latter have their magnitudes in Table 2. They are derived from star-counts made on a $\frac{1}{4}\square^o$ around each variable, and compared with the tables in Groningen Publication no.43.

The main data on the variables are given in Table 1.The periods have been derived by least squares. Phases have been computed with the formula:

$$\text{phase} = P^{-1}(\text{J.D.Hel.} - 2436000).$$

The mean errors in the sixth column correspond to the last two decimals of the periods. The epoch given in column 7 corresponds to the mean J.D. of the plates used. The mean error of a single estimate (last column) has been computed by first taking the difference in magnitude between every two estimates following each other in phase and then using the formula:

$$\text{m.e.} = \pm\sqrt{\frac{\Sigma(\Delta m)^2}{2n}}$$

where n means the number of estimates used.

Table 3 shows the epochs used and the run of the (O - C) comparison for the finally adopted elements.

The estimates have been arranged according to phases and divided into groups for which mean values are given in Table 4.

The normal points of the light-curves are moreover represented graphically in the diagrams 1 to 21.

Remarks about individual variables

* 7 - The minima are sharper than the mexima and the pariod was determined by the aid of the 21 epochs of minimum given in table 3.

*13 - This star is very probably identical with ST Muscae.The variability of the star was discovered by Bailey (H.B.no.792,1923). A period was derived from the present observations.

*15 = DN Muscae

*16 = AG Muscae

*18 = AM Muscae

*19 = AT Muscae

*20 = AV Muscae

The periods of these 5 known variables have here been determined for the first time.

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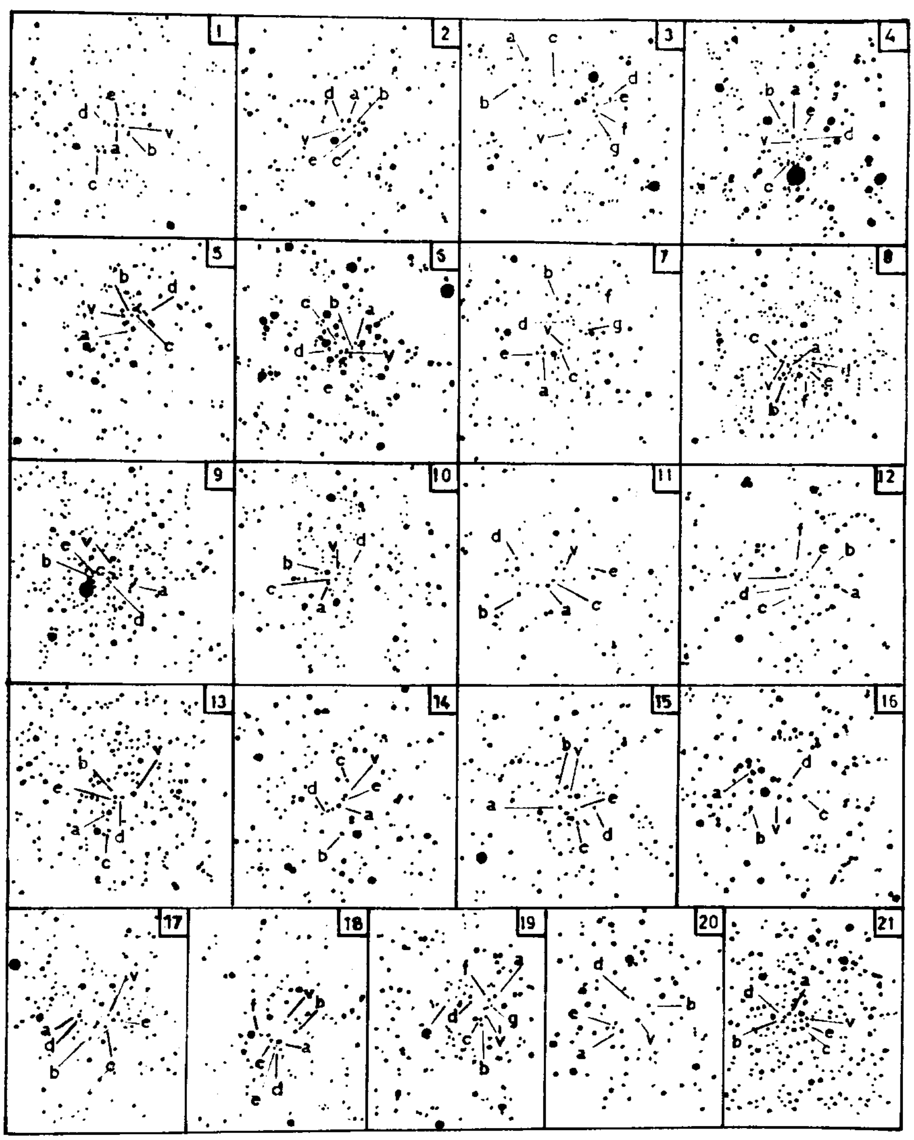
B 3000 LEUVEN (Belgium)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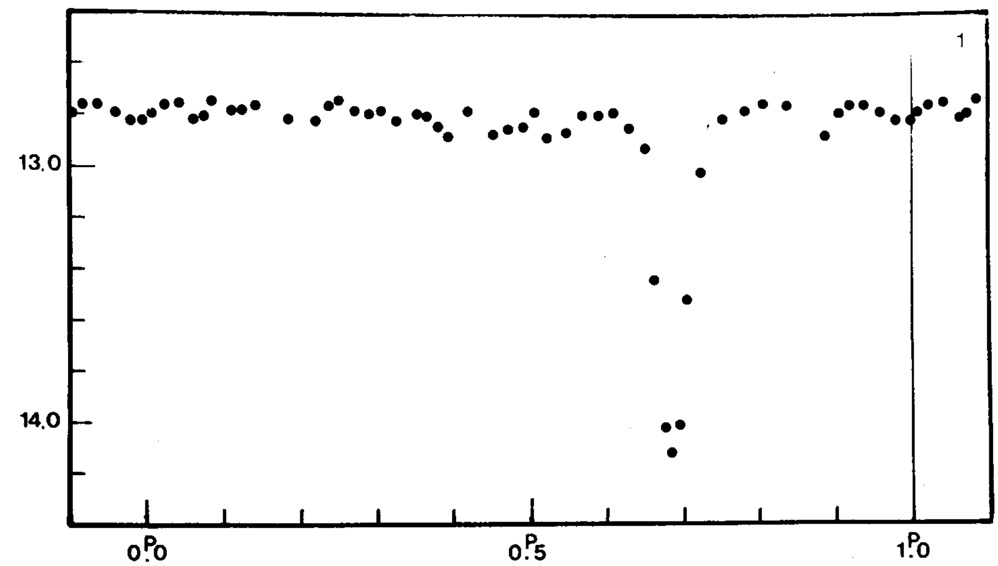
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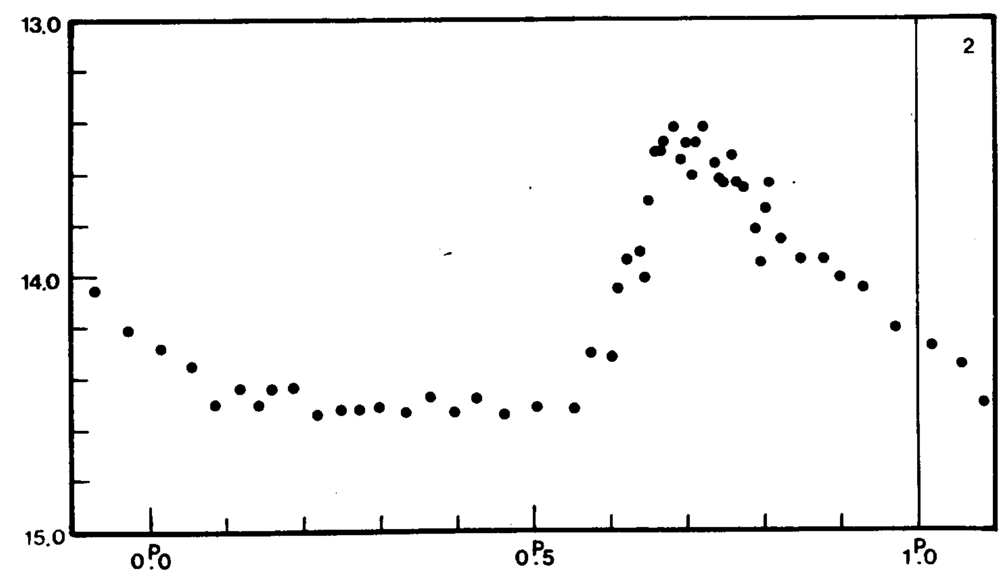
13.0
14.0
0.P0
0.P5
1.P0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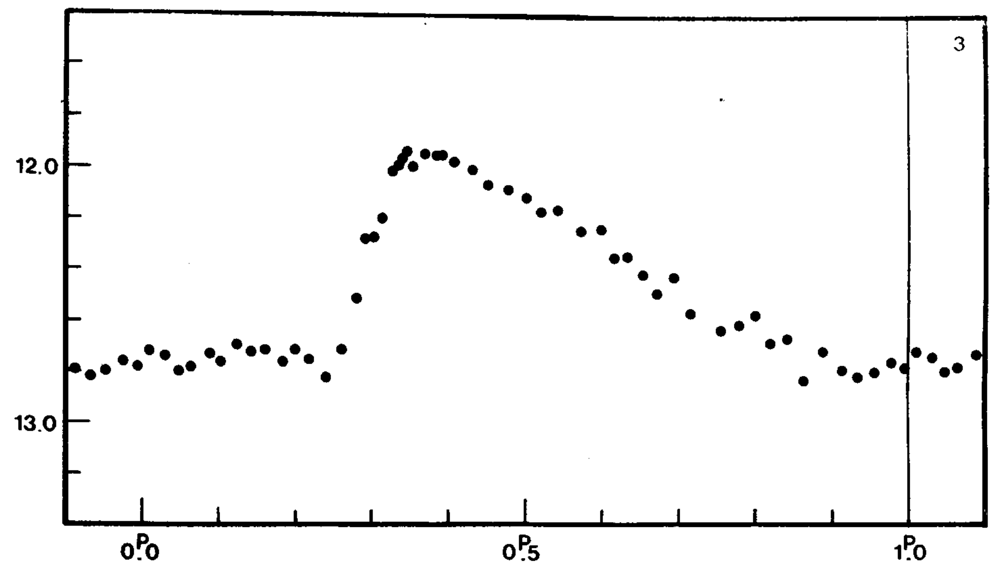
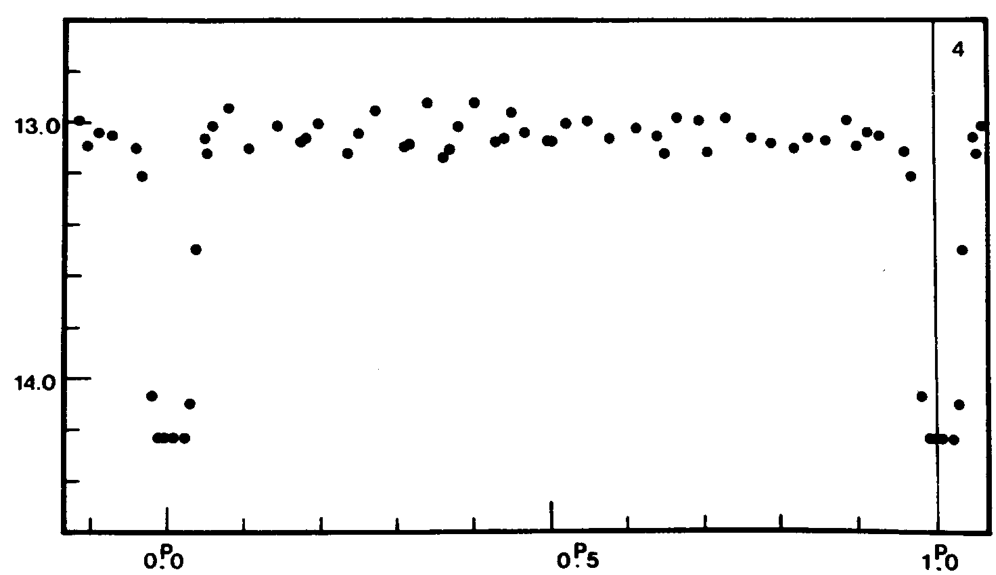
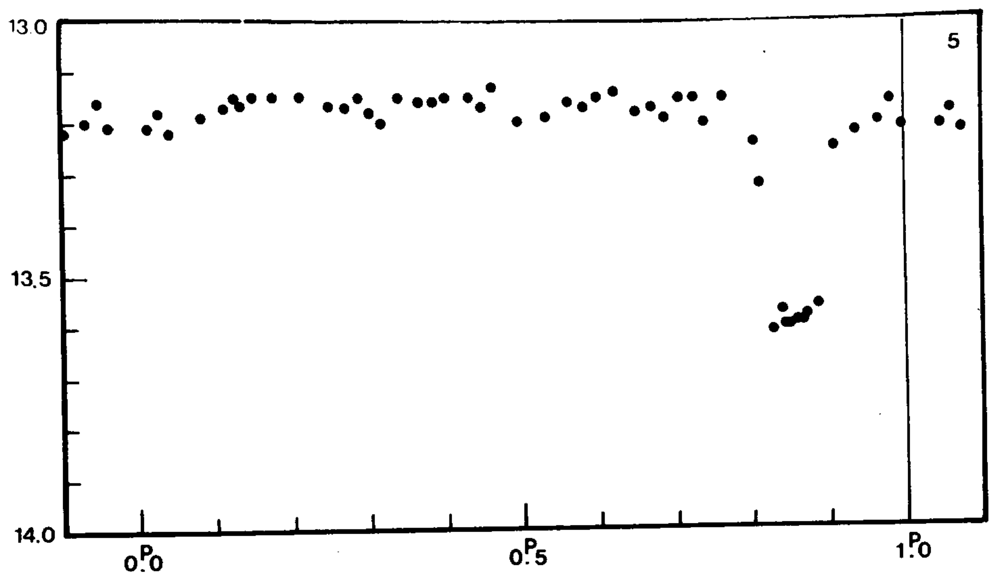
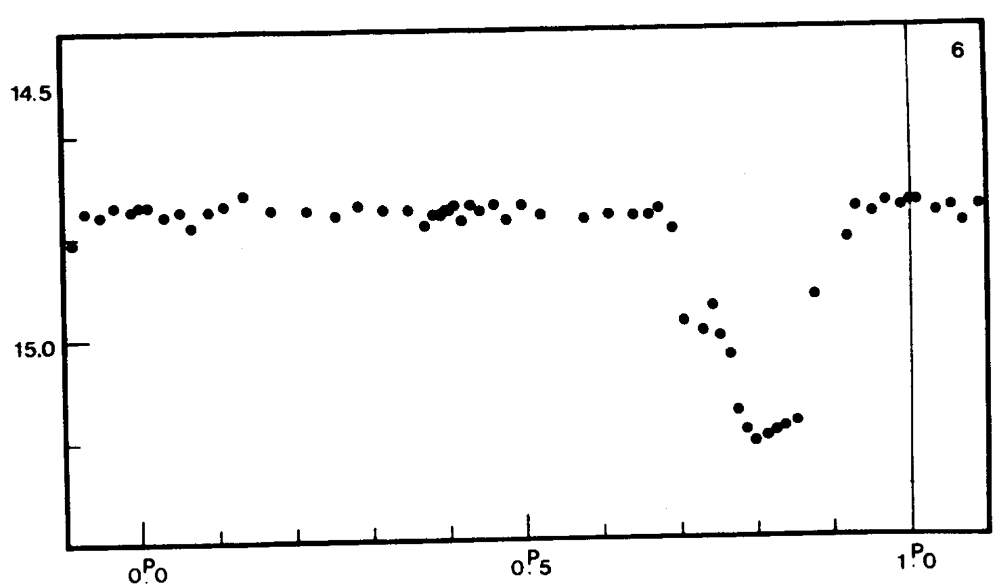
13.0
14.0
15.0
0.P0
0.P5
1.P0


3
12.0
13.0
0.P0
0.P5
1.P0


4
13.0
14.0
0.P0
0.P5
1.P0



13.0
13.5
14.0
5
0.P0
0.P5
1.P0



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6
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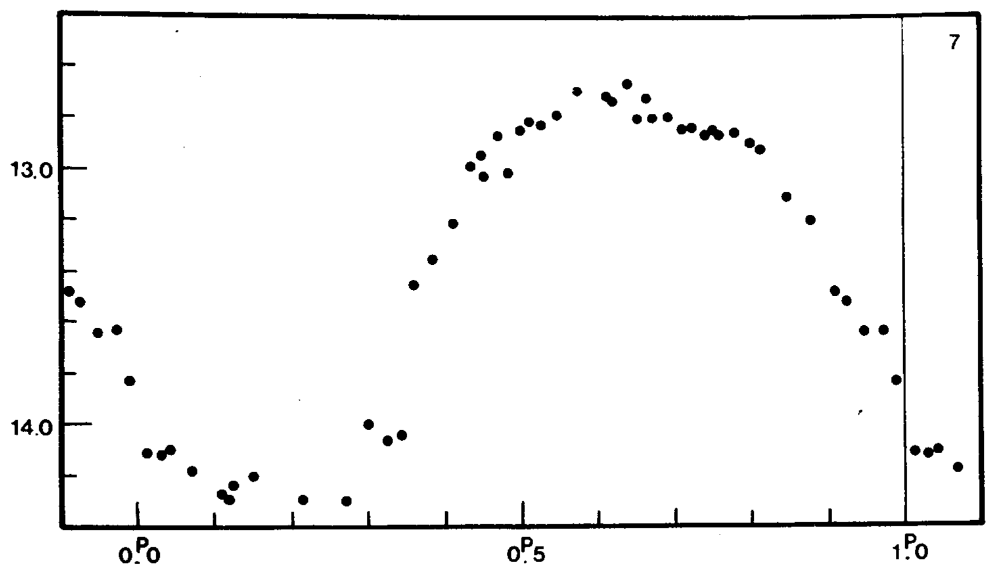
0.P5
1.P0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14.0
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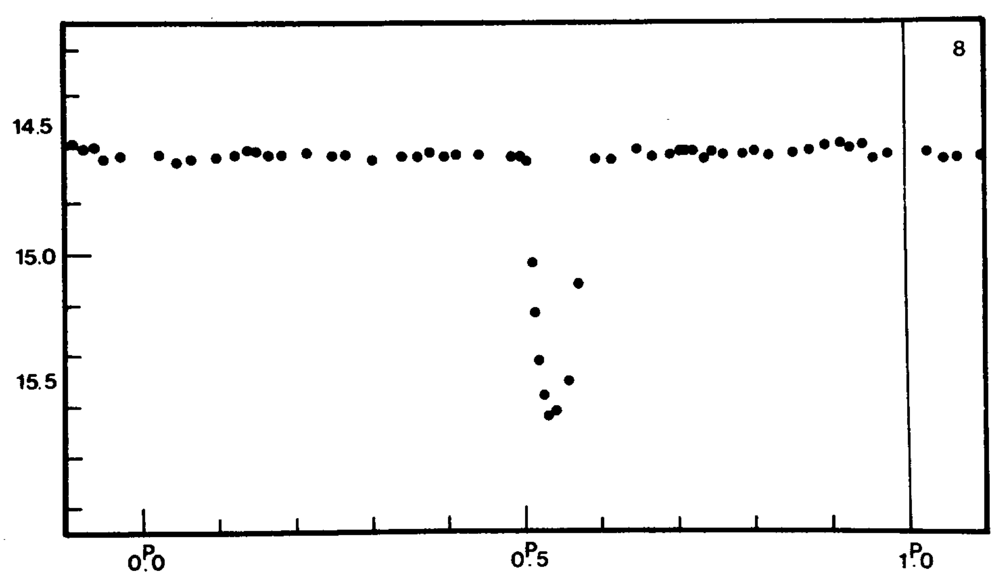
0.P5
1.P0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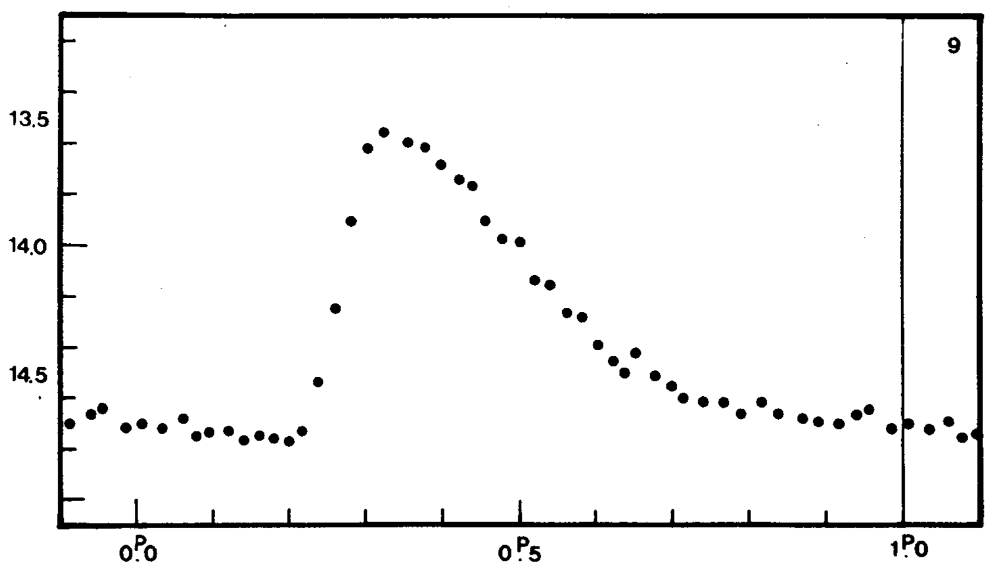
0.P5
1.P0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14.5
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0.P5
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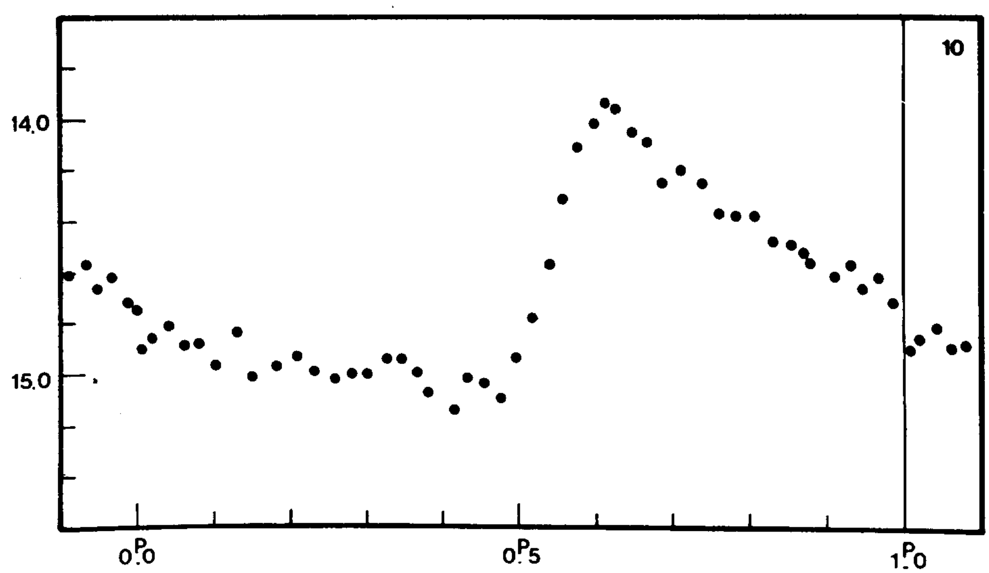
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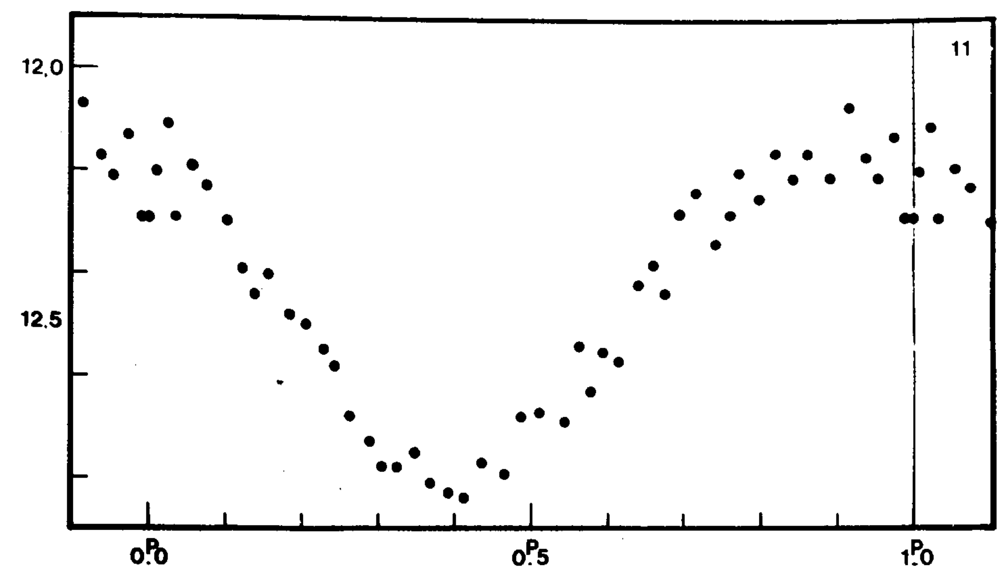
1.P0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12.5
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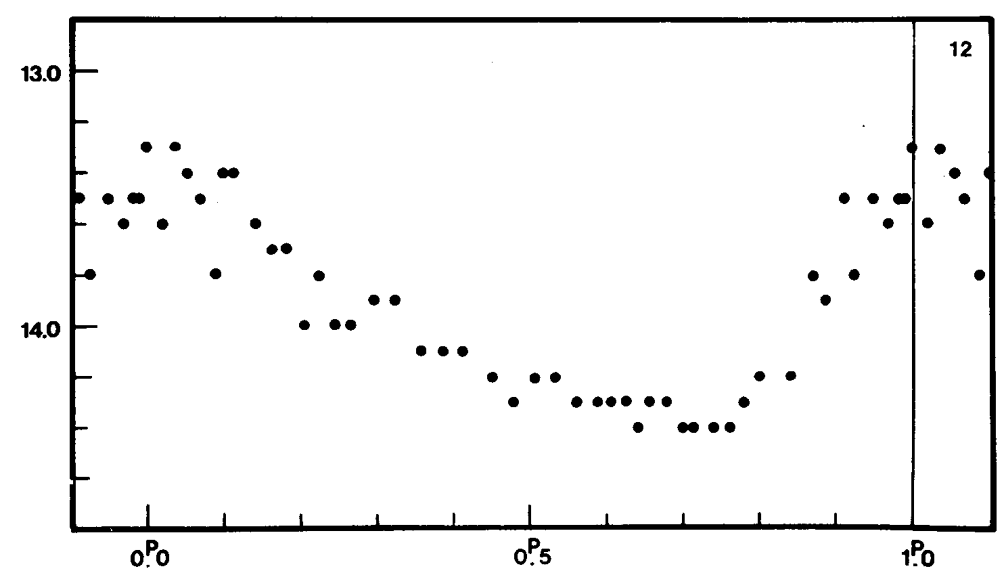
0.P5
1.P0


12
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14.0
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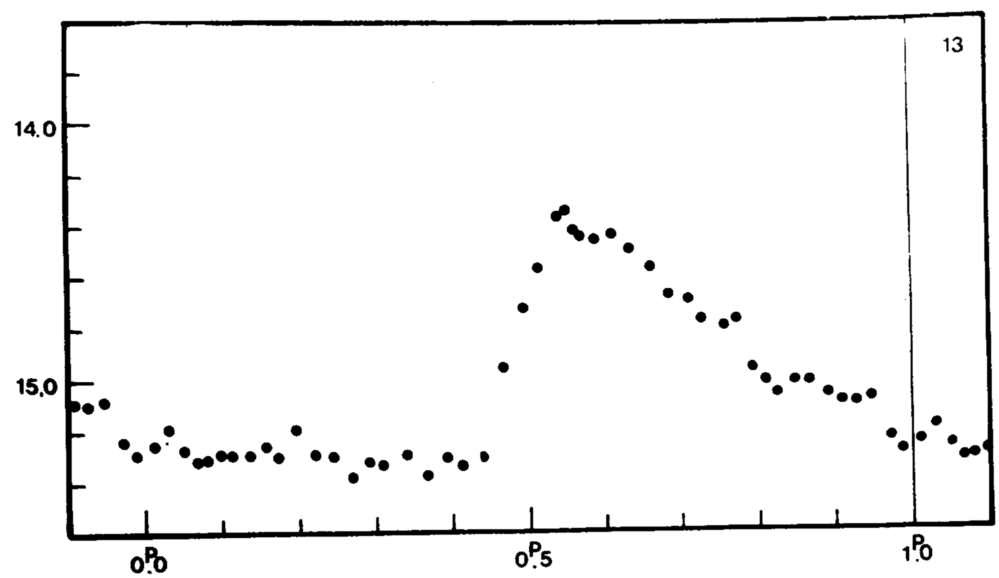
0.P5
1.P0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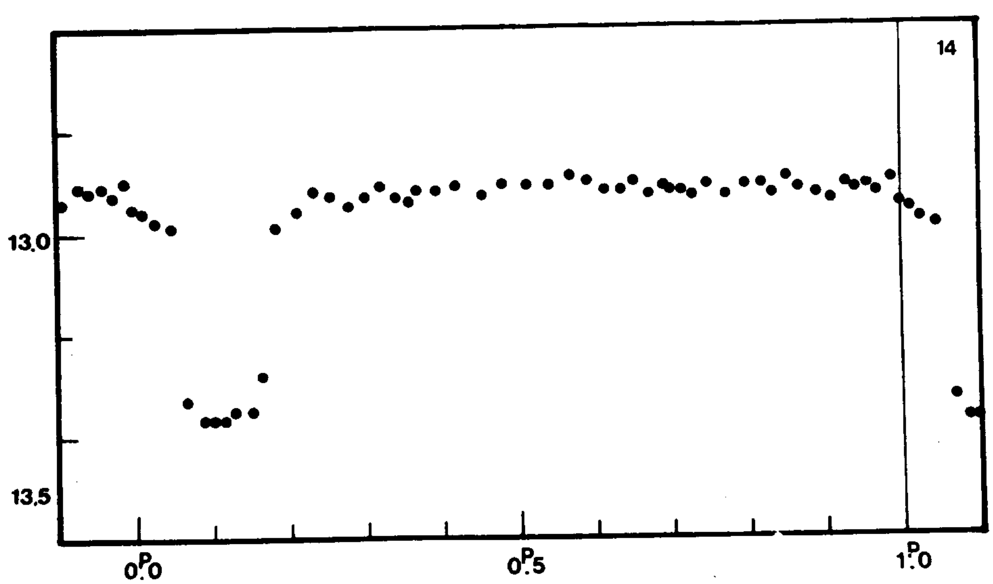
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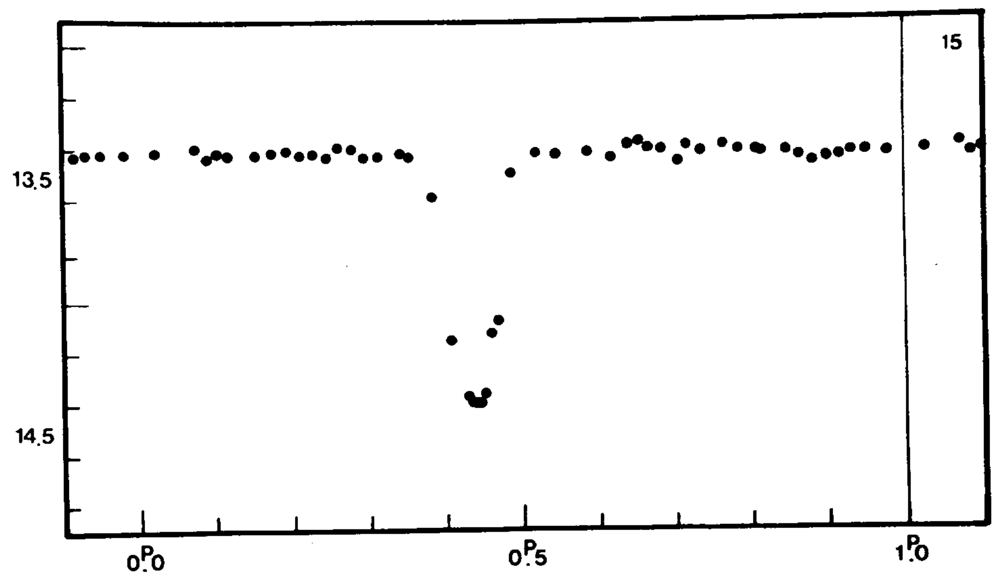
0.P5
1.P0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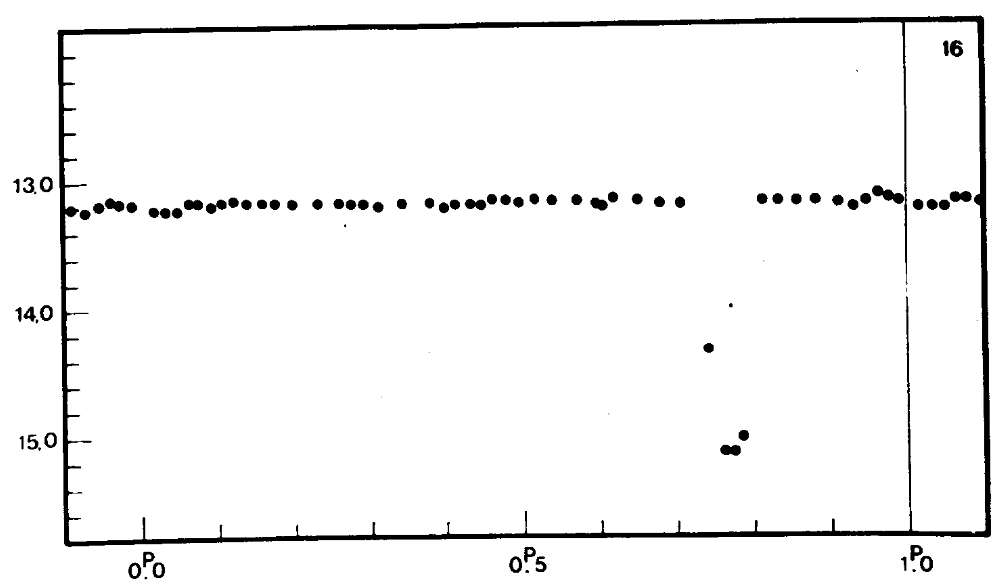
0.P5
1.P0


16
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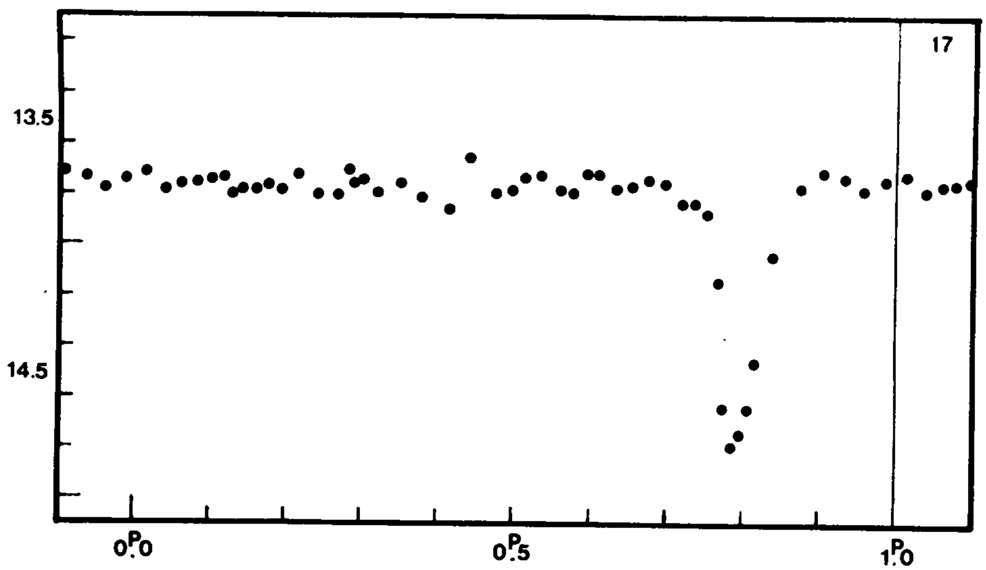
15.0
0.P0
0.P5
1.P0



17
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14.5
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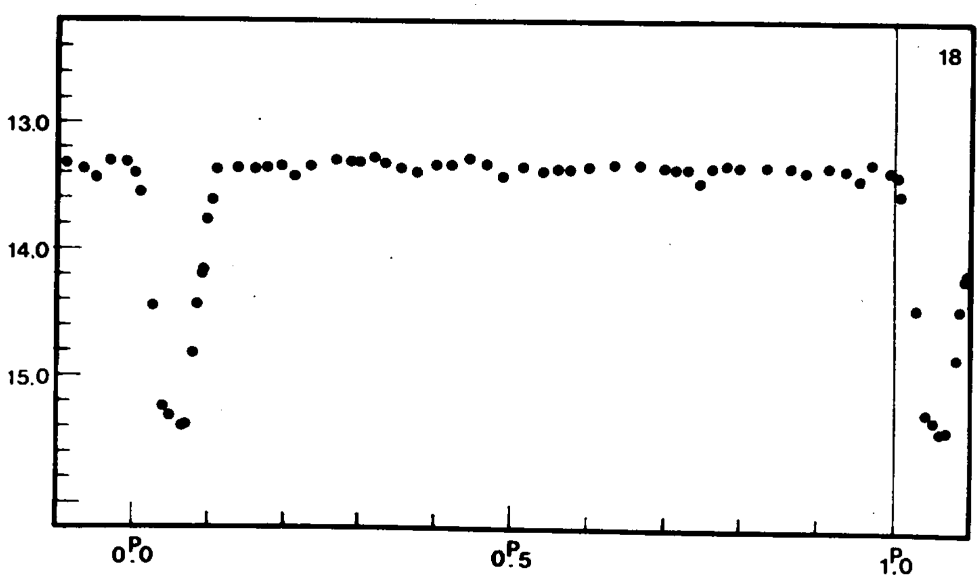
0.P5
1.P0



18
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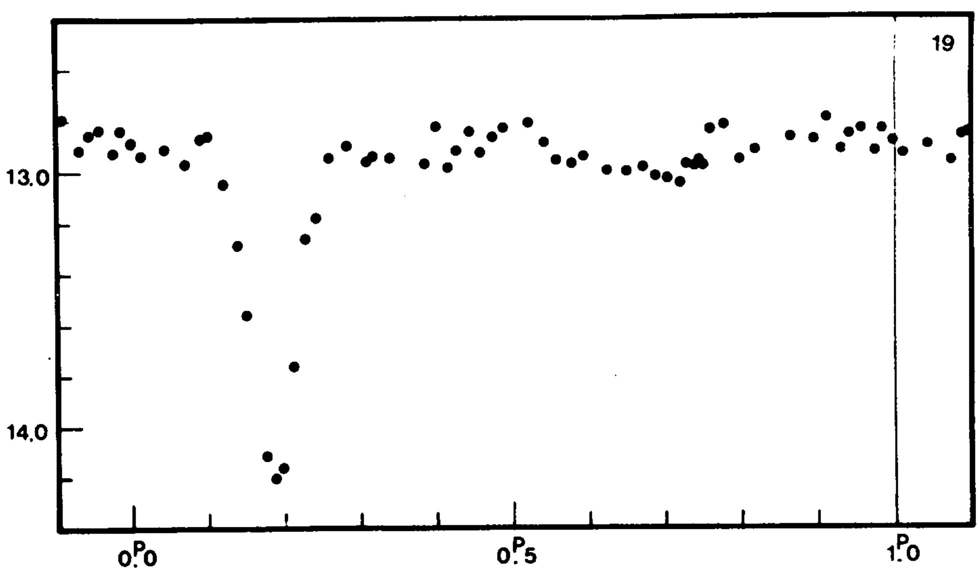
14.0
15.0
0.P0
0.P5
1.P0


19
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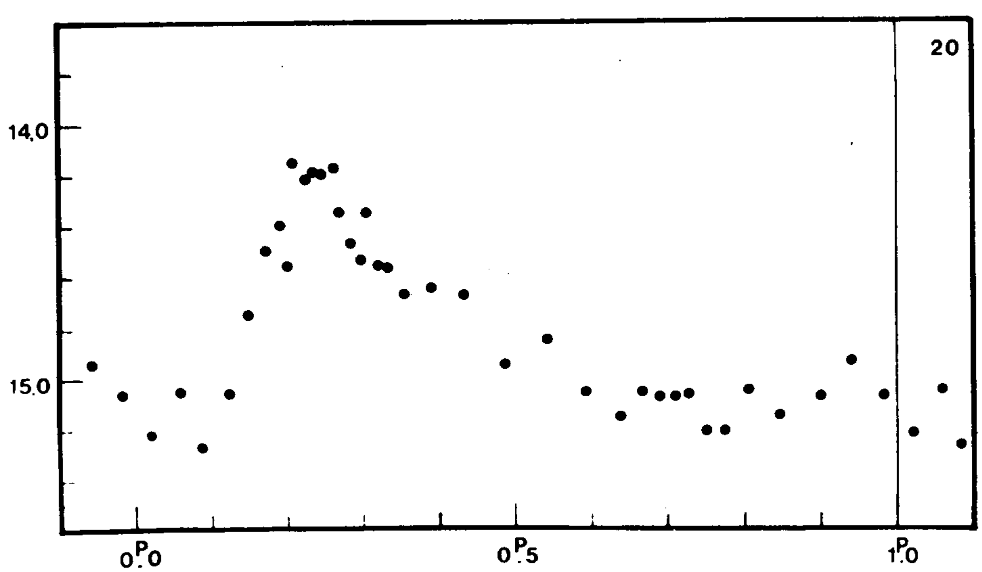
14.0
0.P0
0.P5
1.P0


20
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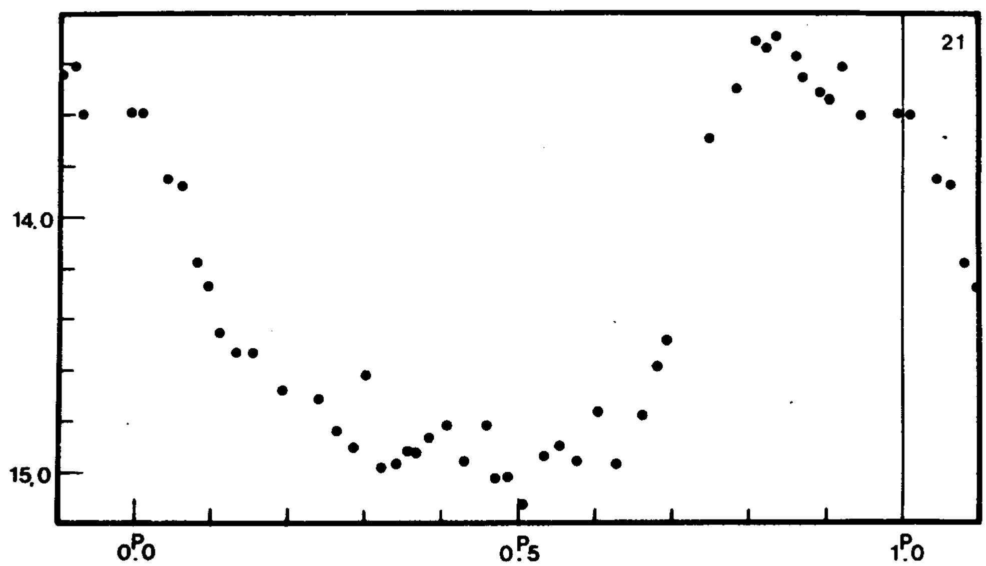
15.0
0.P0
0.P5
1.P0



21
14.0
15.0
0.P0
0.P5
1.P0

TABLE 1

*	R.A. (1875)	Dec.(1875)	Type	Period	m.e.	Epoch J.D. 2438000 +	m.e. of single epoch	phase of epoch	n of epochs	Brightness max.	Brightness min.	n of estim.	m.e. of single estimate
	h m s	° ′		d		d	d	p		m	m		m
1	12 19 51.9	− 69 46.7	EA	2.1593303	± 62	527.896	± .009	.685	10	12.70	14.10	468	± 0.12
2	12 26 08.9	− 73 14.4	RR	0.4868672	23	529.131	.016	.703	23	13.40	14.55	380	0.11
3	12 28 20.0	− 72 11.5	RR	0.4672966	15	536.202	.024	.392	48	11.95	12.83	476	0.13
4	12 31 39.5	− 66 24.4	EA	14.91516	94	536.620	.277	.003	15	12.92	14.23	488	0.13
5	12 32 28.5	− 73 26.5	EA	7.01634	92	532.108	.551	.887	18	13.13	13.60	462	0.09
6	12 35 30.9	− 66 01.1	EA	2.90289	20	533.671	.280	.081	13	14.72	15.21	483	0.12
7	12 35 43.5	− 68 22.2	Cep	21.3395	97	521.422	2.225	.157	21	12.60	14.40	480	0.25
8	12 44 22.1	− 67 06.4	EA	4.59701	15	535.440	.078	.541	11	14.60	15.70	475	0.05
9	12 44 56.7	− 70 32.4	RR	0.3682337	11	536.155	.015	.351	32	13.55	14.80	460	0.13
10	12 47 18.3	− 67 45.0	RR	0.4250001	11	536.241	.013	.625	37	13.90	15.20	480	0.15
11	12 48 29.8	− 74 13.9	RR	0.2296741	08	536.277	.020	.938	42	12.07	12.84	482	0.17
12	12 59 16.3	− 70 31.7	RR	0.3121445	23	529.306	.021	.999	20	13.30	14.40	400	0.14
13	13 00 02.2	− 70 35.5	RR	0.4633682	13	536.278	.015	.569	21	14.30	15.40	465	0.17
14	13 05 54.2	− 65 12.5	EA	0.7560984	42	529.231	.022	.109	16	12.85	13.40	477	0.05
15	13 13 48.0	− 73 54.0	EA	3.636551	72	528.985	.058	.435	9	13.35	14.40	470	0.09
16	13 25 48.5	− 66 40.4	EA	3.168478	31	527.719	.028	.770	9	13.10	15.15	480	0.06
17	13 28 22.5	− 70 16.8	EA	2.184923	24	527.489	.038	.787	11	13.60	14.80	460	0.15
18	13 31 12.7	− 69 06.2	EA	4.54675	13	528.298	.115	.067	18	13.25	15.40	470	0.11
19	13 36 58.3	− 67 14.2	EA	4.67432	13	534.309	.127	.177	14	12.79	14.20	473	0.08
20	13 37 31.4	− 70 00.3	RR	0.6846412	58	529.229	.017	.239	16	14.10	15.30	297	0.17
21	13 38 01.1	− 67 37.5	Cep	4.52478	37	533.218	.247	.854	25	13.25	15.15	440	0.18

TABLE 2

Var 1		Var 2		Var 3		Var 4	
c.s.	mag.	c.s.	mag.	c.s.	mag.	c.s.	mag.
a	12^{m}.00	a	12.70	a	11.98	a	12.50
b	12.71	b	13.60	b	12.11	b	12.89
c	13.25	c	14.00	c	12.25	c	13.24
d	13.86	d	14.50	d	12.41	d	13.51
e	14.19	e	14.80	e	12.53	e	14.11
				f	12.87		
				g	13.27		

Var 5		Var 6		Var 7		Var 8	
c.s.	mag.	c.s.	mag.	c.s.	mag.	c.s.	mag.
a	12.89	a	14.44	a	12.47	a	14.46
b	13.33	b	14.66	b	12.78	b	14.80
c	13.43	c	14.88	c	12.92	c	15.07
d	13.65	d	15.10	d	13.07	d	15.32
		e	15.56	e	13.52	e	15.57
				f	14.02	f	15.75
				g	14.20		

Var 9		Var 10		Var 11		Var 12	
c.s.	mag.	c.s.	mag.	c.s.	mag.	c.s.	mag.
a	13.55	a	13.45	a	11.72	a	12.5
b	13.86	b	14.09	b	12.15	b	13.4
c	14.39	c	14.50	c	12.70	c	13.7
d	14.76	d	15.10	d	12.89	d	14.1
e	15.25			e	13.08	e	14.4
						f	14.9

TABLE 2 (continued)

Var 13		Var 14		Var 15		Var 16	
c.s.	mag.	c.s.	mag.	c.s.	mag.	c.s.	mag.
a	13.58	a	12.61	a	13.21	a	13.02
b	14.46	b	12.82	b	13.60	b	13.35
c	14.88	c	13.05	c	13.86	c	14.47
d	15.44	d	13.91	d	14.32	d	15.13
e	15.66			e	14.53		

Var 17		var 18		Var 19		Var 20	
c.s.	mag.	c.s.	mag.	c.s.	mag.	c.s.	mag.
a	13.50	a	13.07	a	12.68	a	14.06
b	13.73	b	13.37	b	13.05	b	14.60
c	14.12	c	13.61	c	13.18	c	14.85
d	14.44	d	14.16	d	13.32	d	15.45
e	14.95	e	14.63	e	13.53		
		f	15.16	f	13.93		
				g	14.32		

Var 21	
c.s.	mag.
a	12.82
b	13.38
c	13.82
d	14.48
e	15.38

TABLE 3

Var 1

J.D. min -2437000	E	O-C
d 735.430	0	d +0.0077
761.334	12	-0.0001
787.234	24	-0.0118
1234.234	231	+0.0068
2594.615	861	+0.0091
2618.346	872	-0.0119
2644.271	884	+0.0003
2970.329	1035	+0.0002
3050.214	1072	-0.0106
3350.381	1211	+0.0099

Var 2

J.D. max -2437000	E	O-C
407.382	0	-0.0062
409.336	4	-0.0002
429.284	45	-0.0140
432.227	51	+0.0084
465.317	119	-0.0093
466.294	121	-0.0059
467.280	123	+0.0069
468.255	125	+0.0079
487.231	164	-0.0038
700.485	602	+0.0026
755.494	715	-0.0049
758.413	721	-0.0069
759.398	723	+0.0048
760.384	725	+0.0162
761.334	727	-0.0068
781.320	768	+0.0177
1146.435	1518	-0.0185
1229.204	1688	-0.0169
1520.374	2286	+0.0068
1915.267	3097	+0.0506
2267.221	3820	-0.0004
2613.359	4531	-0.0252
2614.354	4533	-0.0037

Var 3

J.D. max -2437000	E	O-C
164.212	0	-0.007
368.405	437	-0.023
397.398	499	-0.002
404.381	514	-0.029
422.210	552	+0.043
456.262	625	-0.018
464.227	642	+0.003
486.214	689	+0.027
492.269	702	+0.007
493.222	704	+0.026
499.259	717	-0.012
782.427	1323	-0.026
784.317	1327	-0.005
785.274	1329	+0.018
790.379	1340	-0.017
792.258	1344	-0.008
820.280	1404	-0.024
1178.314	2170	+0.061
1199.266	2215	-0.015
1206.258	2230	-0.032
1222.222	2264	+0.044
1228.236	2277	-0.018
1439.474	2729	+0.002
1440.456	2731	+0.050
1461.424	2776	-0.011
1475.450	2806	-0.004
1557.204	2981	-0.027
1884.338	3681	+0.000
1906.290	3728	-0.011
1914.262	3745	+0.017
1942.261	3805	-0.022
2233.422	4428	+0.013
2293.233	4556	+0.010
2593.249	5198	+0.022
2594.615	5201	-0.014
2612.359	5239	-0.028
2643.277	5305	+0.050
2923.605	5905	-0.001
2970.329	6005	-0.006
2975.451	6016	-0.025
2977.341	6020	-0.004
3006.306	6082	-0.011
3050.224	6176	-0.019
3326.424	6767	+0.009
3334.375	6784	+0.015
3385.305	6893	+0.010
3742.276	7657	-0.033
3743.266	7659	+0.022

TABLE 3 (continued)

Var 4

J.D. min -2437000	E	O-C
432.228	0	+0.330
700.496	18	+0.125
760.331	22	+0.300
1192.237	51	-0.334
1222.245	53	-0.157
1461.413	69	+0.369
1475.471	70	-0.488
1520.355	73	-0.350
2594.470	145	-0.127
3027.239	174	+0.102
3295.414	192	-0.196
3325.420	194	-0.020
3355.311	196	+0.040
3385.305	198	+0.204
3743.266	222	+0.201

Var 5

J.D. min -2437000	E	O-C
143.318	0	+0.447
409.293	38	-0.199
430.263	41	-0.278
437.269	42	-0.288
465.252	46	-0.371
486.278	49	-0.394
493.265	50	-0.423
1146.370	143	+0.161
1167.315	146	+0.057
1196.259	150	+0.936
1230.242	155	-0.163
1441.448	185	+0.553
1883.344	248	+0.419
2254.255	301	-0.537
2613.359	352	+0.733
2620.383	353	+0.741
3033.249	412	-0.358
3355.322	458	-1.037

Var 6

J.D. min -2437000	E	O-C
143.296	0	+0.110
146.211	1	+0.122
404.381	90	-0.065
465.338	111	-0.069
468.231	112	-0.079
497.232	122	-0.107
755.451	211	-0.245
787.352	222	-0.276
1473.451	458	+0.741
2593.373	844	+0.147
2622.337	854	+0.082
2912.482	954	-0.062
3295.424	1086	-0.301

Var 7

J.D. min -2437000	E	O-C
368.0	0	-1.086
411.0	2	-0.765
433.0	3	-0.105
456.0	4	+1.556
498.0	6	+0.877
693.0	15	+3.821
755.0	18	+1.802
794.0	20	-1.877
1178.0	38	-1.989
1202.0	39	+0.672
1475.0	52	-3.743
1519.0	54	-2.422
1905.0	72	-0.534
2267.0	89	-1.306
2293.0	90	+3.354
2611.0	105	+1.261
2912.0	119	+3.507
2970.0	122	-2.512
3295.0	137	+2.395
3334.0	139	-1.284
3355.0	140	-1.623

TABLE 3 (continued)

Var 8

J.D. min -2437000	E	O-C
409.2701	0	+0.097
432.2062	5	+0.048
464.3227	12	-0.014
487.2847	17	-0.037
735.4407	71	-0.120
758.4773	76	-0.068
795.3127	84	-0.009
1172.3138	166	+0.037
1195.2547	171	-0.007
1880.3460	320	+0.130
2914.4850	545	-0.058

Var 9

J.D. max -2437000	E	O-C
144.233	0	+0.0017
294.505	408	+0.0344
409.368	720	+0.0084
425.223	763	+0.0294
432.206	782	+0.0159
464.219	869	-0.0074
465.348	872	+0.0169
468.266	880	-0.0110
492.204	945	-0.0082
496.252	956	-0.0107
499.237	964	+0.0284
755.494	1660	-0.0053
758.434	1668	-0.0111
761.377	1676	-0.0140
764.340	1684	+0.0031
781.256	1730	-0.0196
782.373	1733	-0.0073
785.317	1741	-0.0092
792.322	1760	-0.0006
795.259	1768	-0.0095
812.208	1814	+0.0007
844.221	1901	-0.0226
1196.274	2857	-0.0010
1461.413	3577	+0.0097
1468.388	3596	-0.0117
1472.427	3607	-0.0233
1493.436	3664	-0.0036
1524.374	3748	+0.0027
2594.456	6654	-0.0025
2914.463	7523	+0.0094
3325.408	8639	+0.0056
3383.226	8796	+0.0109

Var 10

J.D. max -2437000	E	
145.212	0	-0.0039
162.239	40	+0.0231
411.278	626	+0.0120
437.205	687	+0.0140
439.316	692	0.0
465.238	753	-0.0030
467.355	758	-0.0110
468.210	760	-0.0060
488.208	807	+0.0170
493.287	819	-0.0040
496.252	826	-0.0140
499.237	833	-0.0040
755.494	1436	-0.0221
758.477	1443	-0.0141
759.333	1445	-0.0081
782.298	1499	+0.0069
785.253	1506	-0.0131
790.368	1518	+0.0019
793.345	1525	+0.0039
1167.336	2405	-0.0052
1196.259	2473	+0.0177
1205.192	2494	+0.0257
1230.241	2553	-0.0003
1233.210	2560	-0.0063
1441.448	3050	-0.0183
1461.435	3097	-0.0063
1467.390	3111	-0.0013
1475.450	3130	-0.0163
1521.368	3238	+0.0016
1530.325	3259	+0.0336
1881.343	4085	+0.0015
1901.309	4132	-0.0075
1904.294	4139	+0.0025
2267.242	4993	+0.0004
2594.487	5763	-0.0047
3052.228	6840	+0.0112
3386.262	7626	-0.0050

TABLE 3 (continued)

Var 11

J.D. min -2437000	E	0-C
143.297	0	-0.0063
144.233	4	+0.0110
164.233	91	+0.0293
169.236	113	-0.0205
368.382	980	-0.0019
403.312	1132	+0.0176
408.342	1154	-0.0052
409.270	1158	+0.0041
432.206	1258	-0.0273
437.291	1280	+0.0049
439.316	1289	-0.0372
465.295	1402	-0.0114
468.276	1415	-0.0161
483.220	1480	-0.0009
488.294	1502	+0.0202
494.252	1528	+0.0067
756 313	2669	+0.0096
758.392	2678	+0.0215
759.311	2682	+0.0218
761.356	2691	-0.0002
782.277	2782	+0.0204
784.306	2791	-0.0177
785.274	2795	+0.0316
787.267	2804	-0.0424
792.333	2826	-0.0293
1168.332	4463	-0.0067
1171.337	4476	+0.0125
1197.280	4589	+0.0024
1518.330	5987	-0.0320
1519.295	5991	+0.0143
1943.247	7837	-0.0120
2232.415	9096	-0.0037
2254.255	9191	+0.0173
2259.326	9213	+0.0354
2594.601	10673	-0.0137
2611.361	10746	-0.0199
2614.375	10759	+0.0084
2626.328	10811	+0.0183
2915.491	12070	+0.0216
2975.429	12331	+0.0147
3742.287	15670	-0.0091
3745.250	15683	-0.0317

Var 12

J.D. max -2437000	E	0-C
379.363	0	-0.0028
403.377	77	-0.0243
404.338	80	-0.0002
408.406	93	+0.0107
409.314	96	-0.0176
429.284	160	-0.0256
430.220	163	-0.0258
439.294	192	-0.0035
464.280	272	+0.0104
468.362	285	+0.0349
494.263	368	+0.0275
782.330	1291	-0.0143
787.342	1307	+0.0028
793.255	1326	-0.0147
1145.402	2454	+0.0332
1196.270	2617	+0.0213
1473.428	3505	-0.0043
1493.415	3569	+0.0055
2230.399	5930	+0.0166
2594.313	7096	-0.0307

Var 13

J.D. max -2437000	E	0-C
145.234	0	-0.0126
164.233	41	-0.0116
397.345	544	+0.0258
403.333	557	-0.0094
409.357	570	-0.0092
468.210	697	-0.0044
493.244	751	+0.0077
755.494	1317	-0.0089
764.329	1336	+0.0224
782.384	1375	+0.0061
1168.353	2208	-0.0104
1195.254	2266	+0.0152
1915.309	3820	-0.0046
2230.378	4500	-0.0252
2594.628	5286	+0.0173
2912.504	5972	+0.0229
2923.605	5996	+0.0022
2977.341	6112	-0.0119
3324.405	6861	-0.0108
3350.381	6917	+0.0166
3357.297	6932	-0.0181

TABLE 3 (continued)

Var 14

J.D. min -2437000	E	O-C
143.3078	0	+0.0047
162.2280	25	+0.0224
294.5160	200	-0.0068
397.3769	336	+0.0247
400.3649	340	-0.0117
700.5174	737	-0.0302
1219.2141	1423	-0.0170
1222.2446	1427	-0.0109
1557.2035	1870	-0.0036
1885.3415	2304	-0.0122
1904.2937	2329	+0.0375
2232.4152	2763	+0.0123
2594.5553	3242	-0.0187
2626.3281	3284	-0.0020
2923.5131	3677	+0.0363
2970.3293	3739	-0.0256

Var 15

J.D. min -2437000	E	O-C
456.2402	0	+0.0379
496.2414	11	+0.0370
1205.2136	206	-0.1183
1474.4269	280	-0.0098
1885.3415	393	-0.0255
2267.2547	498	+0.0498
2594.5498	588	+0.0552
3027.2392	707	-0.0050
3325.4196	789	-0.0218

Var 16

J.D. min -2437000	E	O-C
146.2219	0	-0.0401
409.2815	83	+0.0358
466.2822	101	+0.0039
1502.4014	428	+0.0307
1521.3679	434	-0.0136
1914.2622	558	-0.0107
2595.4649	773	-0.0308
2611.3613	778	+0.0232
2915.5130	874	+0.0010

Var 17

J.D. min -2437000	E	O-C
437.2372	0	+0.0243
496.2307	27	+0.0249
758.4023	147	+0.0058
782.4055	158	-0.0252
793.3500	163	-0.0053
1171.3478	336	+0.0008
1206.2583	352	-0.0474
1914.2622	676	+0.0416
2613.3489	996	-0.0471
3334.3853	1326	-0.0351
3391.2914	1352	+0.0630

Var 18

J.D. min -2437000	E	O-C
164.2116	0	-0.0606
464.2881	66	-0.0698
487.2204	71	+0.1288
496.2200	73	+0.0349
755.4508	130	+0.1007
764.3933	132	-0.0503
782.4270	136	-0.2036
787.2237	137	+0.0464
1146.3809	216	+0.0101
1196.2697	227	-0.1154
1219.2141	232	+0.0953
1228.2244	234	+0.0120
1519.2954	298	+0.0909
1887.3381	379	-0.1534
1901.3089	382	+0.1771
3033.2378	631	-0.0354
3324.4051	695	+0.1397
3383.2256	708	-0.1476

Var 19

J.D. min -2437000	E	O-C
146.211	0	+0.175
169.215	5	-0.193
403.269	55	+0.145
487.274	73	+0.012
758.434	131	+0.062
1146.370	214	+0.029
1202.279	226	-0.154
1473.428	284	-0.115
1501.404	290	-0.185
1880.346	371	+0.137
2595.465	524	+0.085

TABLE 3 (continued)

Var 19 (cont.)

J.D. min -2437000	E	0-C
3357.297	687	+0.003
3385.305	693	-0.035
3745.297	770	+0.034

Var 20

J.D. max -2437000	E	0-C
400.2672	0	+0.0119
404.3590	6	-0.0041
437.2050	54	-0.0209
439.2944	57	+0.0146
465.2842	95	-0.0120
467.3338	98	-0.0163
487.2203	127	+0.0156
756.3130	520	+0.0443
760.3620	526	-0.0145
782.2875	558	+0.0024
784.3384	561	-0.0006
793.2336	574	-0.0057
795.2913	577	-0.0019
1461.4347	1550	-0.0144
1474.4498	1569	-0.0075
2267.2802	2727	+0.0084

Var 21

J.D. max -2437000	E	0-C
144.233	0	+0.1234
162.227	4	+0.0182
379.352	52	-0.0463
397.377	56	-0.1205
411.278	59	+0.2062
425.223	62	+0.5768
429.284	63	+0.1131
438.265	65	+0.0445
456.217	69	-0.1026
465.202	71	-0.1672
483.241	75	-0.2273
488.207	76	+0.2139
492.215	77	-0.3029
497.232	78	+0.1893
700.480	123	-0.1779
759.333	136	-0.1471
764.317	137	+0.3121
782.351	141	+0.2470
795.300	144	-0.3783

Var 21 (cont.)

J.D. max -2437000	E	0-C
1171.347	227	+0.1117
1234.234	241	-0.3483
1474.450	294	+0.0542
1501.404	300	-0.1405
1519.295	304	-0.3486
3031.217	638	+0.2959

TABLE 4

1			2			3		
n	phase	bright-ness	n	phase	bright-ness	n	phase	bright-ness
	p	m						
10	.006	12.79	10	.015	14.28	10	.009	12.72
10	.024	12.76	10	.055	14.35	10	.031	12.74
10	.044	12.75	10	.085	14.50	10	.047	12.80
10	.060	12.81	10	.117	14.44	10	.065	12.78
10	.072	12.80	10	.140	14.50	10	.088	12.73
10	.086	12.74	10	.158	14.44	10	.103	12.76
10	.108	12.78	10	.187	14.43	10	.124	12.69
10	.127	12.78	10	.217	14.54	10	.142	12.72
10	.143	12.76	10	.248	14.52	10	.158	12.71
10	.186	12.81	10	.274	14.52	10	.183	12.76
10	.220	12.82	10	.297	14.51	10	.197	12.71
10	.236	12.76	10	.334	14.53	10	.217	12.75
10	.251	12.74	10	.365	14.47	10	.240	12.82
10	.271	12.78	10	.395	14.53	10	.258	12.71
10	.290	12.79	10	.424	14.48	5	.278	12.51
10	.306	12.78	10	.459	14.54	5	.289	12.28
10	.327	12.82	10	.503	14.51	5	.301	12.27
10	.353	12.79	10	.550	14.52	5	.314	12.20
10	.367	12.80	10	.574	14.30	5	.325	12.02
10	.379	12.84	10	.599	14.32	5	.333	12.00
10	.397	12.88	5	.609	14.05	5	.337	11.97
10	.419	12.78	5	.623	13.94	5	.345	11.95
10	.452	12.87	5	.636	13.91	5	.354	12.00
10	.473	12.85	5	.643	14.01	5	.366	11.95
10	.492	12.84	5	.648	13.71	5	.386	11.96
10	.507	12.78	5	.658	13.52	5	.391	11.96
10	.525	12.88	5	.666	13.52	10	.407	11.98
10	.549	12.86	5	.672	13.48	10	.431	12.01
10	.570	12.79	5	.683	13.42	10	.452	12.07
10	.592	12.79	5	.691	13.55	10	.478	12.09
10	.611	12.78	5	.698	13.48	10	.500	12.12
10	.633	12.84	5	.705	13.61	10	.520	12.18
5	.652	12.92	5	.713	13.48	10	.541	12.17
5	.664	13.44	5	.722	13.42	10	.570	12.25
5	.677	14.02	5	.735	13.56	10	.597	12.24
5	.684	14.12	5	.741	13.62	10	.615	12.36
5	.696	14.01	5	.748	13.64	10	.633	12.35
5	.705	13.52	5	.758	13.53	10	.651	12.42
10	.726	13.02	5	.763	13.64	10	.671	12.50
10	.756	12.81	5	.776	13.65	10	.693	12.43
10	.782	12.78	5	.788	13.82	10	.714	12.57
10	.807	12.75	5	.796	13.95	10	.733	12.57
10	.837	12.76	5	.802	13.74	10	.754	12.64
10	.887	12.88	5	.807	13.64	10	.779	12.62
10	.904	12.79	10	.823	13.86	10	.799	12.58
10	.917	12.76	10	.848	13.94	10	.819	12.69
10	.936	12.76	10	.877	13.94	10	.842	12.67
10	.959	12.79	10	.899	14.01	10	.862	12.83
10	.979	12.82	10	.931	14.05	10	.888	12.72
8	.995	12.82	10	.972	14.21	10	.913	12.79

TABLE 4 (continued)

3 (contin.)

n	phase	brightness
10	.933	12.82
10	.956	12.80
10	.976	12.76
6	.993	12.78

4

n	phase	brightness
10	.005	14.23
10	.021	14.23
5	.028	14.10
5	.034	13.50
5	.046	13.06
5	.051	13.12
10	.058	13.01
10	.080	12.94
10	.104	13.10
10	.143	13.01
10	.166	13.07
10	.179	13.06
10	.196	13.00
10	.236	13.12
10	.248	13.04
10	.275	12.95
10	.307	13.09
10	.316	13.08
10	.338	12.92
10	.360	13.13
10	.369	13.10
10	.380	13.01
10	.400	12.92
10	.428	13.07
10	.438	13.06
10	.448	12.96
10	.464	13.04
10	.493	13.07
10	.501	13.08
10	.519	13.00
10	.545	12.99
10	.572	13.06
10	.611	13.02
10	.635	13.05
10	.648	13.12
10	.664	12.98
10	.692	12.99
10	.703	13.11
10	.727	12.98
10	.761	13.06
10	.785	13.08
10	.815	13.10
10	.835	13.06
10	.856	13.07
10	.885	12.99
10	.896	13.09
10	.911	13.04
10	.928	13.05
5	.959	13.10
5	.966	13.21
5	.979	14.07
5	.989	14.23
8	.995	14.23

5

n	phase	brightness
10	.013	13.21
10	.027	13.18
10	.040	13.22
10	.083	13.19
10	.113	13.17
10	.125	13.15
10	.134	13.17
10	.151	13.15
10	.178	13.15
10	.212	13.15
10	.249	13.17
10	.269	13.17
10	.287	13.15
10	.301	13.18
10	.317	13.20
10	.338	13.15
10	.364	13.16
10	.383	13.16
10	.400	13.15
10	.431	13.15
10	.447	13.17
10	.462	13.13
10	.495	13.20
10	.533	13.19
10	.561	13.16
10	.581	13.17
10	.595	13.15
10	.621	13.14
10	.649	13.18
10	.671	13.17
10	.687	13.19
10	.706	13.15
10	.725	13.15
10	.740	13.20
10	.764	13.15
10	.803	13.24
5	.812	13.32
10	.826	13.61
10	.838	13.57
5	.844	13.60
5	.849	13.60
5	.859	13.59
5	.866	13.59
5	.872	13.58
5	.888	13.56
10	.909	13.25
10	.937	13.22
10	.968	13.20
10	.982	13.16
7	.995	13.21

6

n	phase	brightness
10	.011	14.74
10	.033	14.76
10	.053	14.75
10	.066	14.78
10	.090	14.75
10	.110	14.74
10	.136	14.72
10	.171	14.75
10	.217	14.75
10	.257	14.76
10	.284	14.74
10	.316	14.75
10	.348	14.75
10	.370	14.78
10	.382	14.76
10	.390	14.76
10	.396	14.75
10	.402	14.75
10	.408	14.74
10	.418	14.77
10	.430	14.74
10	.442	14.75
10	.461	14.74
10	.476	14.76
10	.495	14.74
10	.522	14.76
10	.578	14.77
10	.611	14.76
10	.643	14.76
10	.661	14.76
10	.675	14.75
10	.693	14.79
10	.706	14.97
10	.730	14.99
10	.744	14.94
10	.754	15.00
10	.766	15.04
10	.777	15.15
10	.786	15.19
10	.797	15.21

TABLE 4 (continued)

6 (contin.)

n	phase	brightness
10	.814	15.20
10	.824	15.19
5	.837	15.18
5	.854	15.17
5	.876	14.92
5	.913	14.81
10	.929	14.75
10	.951	14.76
10	.968	14.74
10	.988	14.75
3	.999	14.74

7

n	phase	brightness
10	.009	14.11
10	.030	14.12
10	.043	14.10
10	.069	14.18
10	.108	14.27
10	.118	14.29
10	.123	14.24
10	.152	14.20
10	.216	14.29
10	.263	14.29
10	.299	14.00
10	.324	14.06
10	.342	14.04
10	.358	13.45
10	.385	13.35
10	.408	13.21
10	.433	12.99
10	.444	12.95
10	.450	13.03
10	.469	12.87
10	.482	13.02
10	.495	12.85
10	.510	12.82
10	.525	12.83
10	.544	12.79
10	.573	12.69
10	.609	12.71
10	.618	12.73
10	.627	12.66
10	.652	12.80
10	.663	12.72
10	.672	12.80
10	.691	12.79
10	.707	12.84
10	.725	12.83
10	.742	12.86
10	.752	12.84
10	.759	12.86
10	.778	12.85
10	.800	12.89
10	.815	12.92
10	.845	13.11
10	.879	13.20
10	.912	13.48
10	.926	13.52
10	.947	13.64
10	.973	13.63
10	.990	13.83

8

n	phase	brightness
10	.023	14.61
10	.047	14.64
10	.064	14.63
10	.098	14.63
10	.123	14.61
10	.139	14.59
10	.151	14.60
10	.164	14.63
10	.183	14.61
10	.217	14.60
10	.252	14.62
10	.265	14.61
10	.300	14.63
10	.340	14.62
10	.360	14.62
10	.376	14.60
10	.396	14.62
10	.410	14.61
10	.440	14.61
10	.481	14.62
10	.493	14.62
5	.502	14.64
5	.508	15.04
5	.514	15.23
5	.518	15.42
5	.524	15.56
5	.530	15.64
5	.540	15.62
5	.556	15.50
5	.568	15.12
10	.592	14.63
10	.616	14.63
10	.647	14.59
10	.666	14.62
10	.689	14.61
10	.702	14.60
10	.709	14.60
10	.719	14.60
10	.733	14.61
10	.742	14.60
10	.758	14.62
10	.783	14.61
10	.793	14.62
10	.849	14.61
10	.871	14.60
10	.891	14.58
10	.912	14.57
10	.924	14.59
10	.940	14.58
10	.954	14.63
10	.974	14.62

9

n	phase	brightness
10	.006	14.70
10	.034	14.72
10	.060	14.69
10	.075	14.75
10	.095	14.74
10	.120	14.73
10	.140	14.77
10	.160	14.75
10	.178	14.76
10	.198	14.77
10	.217	14.73
10	.238	14.54
10	.259	14.25
10	.278	13.90
10	.300	13.61
10	.323	13.55
10	.354	13.59
10	.376	13.61
10	.395	13.68
10	.420	13.74
10	.438	13.76
10	.454	13.90
10	.477	13.97
10	.500	13.98
10	.519	14.13
10	.539	14.15
10	.562	14.26
10	.582	14.28
10	.603	14.39

TABLE 4 (continued)

9 (contin.)

n	phase	bright-ness
10	.623	14.45
10	.636	14.50
10	.653	14.42
10	.678	14.51
10	.698	14.55
10	.714	14.60
10	.740	14.61
10	.768	14.61
10	.791	14.66
10	.817	14.61
10	.838	14.66
10	.871	14.68
10	.892	14.69
10	.916	14.70
10	.940	14.66
10	.955	14.64
10	.986	14.72

10

n	phase	bright-ness
10	.006	14.90
10	.019	14.86
10	.042	14.81
10	.061	14.89
10	.079	14.88
10	.102	14.96
10	.131	14.84
10	.150	15.01
10	.181	14.97
10	.206	14.93
10	.233	14.99
10	.259	15.02
10	.281	15.00
10	.301	15.00
10	.327	14.94
10	.346	14.94
10	.367	14.99
10	.379	15.07
10	.412	15.14
10	.432	15.01
10	.454	15.03
10	.477	15.09
10	.494	14.93
10	.517	14.78
10	.539	14.57
10	.555	14.31

10	.575	14.11
10	.596	14.02
10	.612	13.94
10	.625	13.96
10	.648	14.05
10	.666	14.09
10	.687	14.25
10	.709	14.20
10	.739	14.25
10	.760	14.37
10	.782	14.38
10	.804	14.38
10	.830	14.48
10	.854	14.49
10	.869	14.52
10	.876	14.56
10	.910	14.61
10	.932	14.57
10	.947	14.66
10	.966	14.62
10	.986	14.72
10	.997	14.85

11

n	phase	bright-ness
10	.006	12.20
10	.023	12.11
10	.035	12.29
10	.053	12.19
10	.073	12.23
10	.098	12.30
10	.120	12.39
10	.137	12.44
10	.155	12.40
10	.184	12.48
10	.205	12.50
10	.228	12.55
10	.243	12.58
10	.263	12.68
10	.288	12.73
10	.305	12.78
10	.326	12.78
10	.346	12.75
10	.367	12.81
10	.391	12.83
10	.411	12.84
10	.437	12.77
10	.465	12.79
10	.486	12.68
10	.511	12.67
10	.544	12.69

10	.561	12.54
10	.578	12.63
10	.594	12.55
10	.617	12.57
10	.639	12.42
10	.658	12.38
10	.673	12.44
10	.692	12.28
10	.716	12.24
10	.741	12.34
10	.759	12.28
10	.772	12.20
10	.798	12.25
10	.820	12.16
10	.843	12.21
10	.860	12.16
10	.891	12.21
10	.915	12.07
10	.936	12.17
10	.952	12.21
10	.971	12.13
10	.989	12.29
2	.999	12.29

12

n	phase	bright-ness
5	.018	13.6
5	.034	13.3
5	.051	13.4
5	.066	13.5
5	.087	13.8
5	.098	13.4
5	.114	13.4
5	.139	13.6
10	.159	13.7
10	.184	13.7
10	.203	14.0
10	.224	13.8
10	.243	14.0
10	.264	14.0
10	.295	13.9
10	.322	13.9
10	.357	14.1
10	.384	14.1
10	.410	14.1
10	.450	14.2
10	.477	14.3
10	.505	14.2
10	.531	14.2
10	.560	14.3
10	.585	14.3

TABLE 4 (continued)

12 (contin.)

n	phase	brightness
10	.603	14.3
10	.624	14.3
10	.638	14.4
10	.656	14.3
10	.678	14.3
10	.699	14.4
10	.716	14.4
10	.741	14.4
10	.762	14.4
10	.780	14.3
10	.799	14.2
10	.840	14.2
10	.869	13.8
10	.886	13.9
10	.909	13.5
10	.924	13.8
10	.948	13.5
5	.967	13.6
5	.980	13.5
5	.987	13.5
5	.997	13.3

13

n	phase	brightness
10	.012	15.25
10	.032	15.19
10	.050	15.27
10	.066	15.32
10	.080	15.31
10	.096	15.29
10	.114	15.29
10	.135	15.29
10	.158	15.26
10	.172	15.30
10	.196	15.19
10	.221	15.29
10	.244	15.30
10	.271	15.38
10	.291	15.32
10	.309	15.33
10	.341	15.29
10	.366	15.37
10	.393	15.30
10	.414	15.35
10	.440	15.30
10	.466	14.95
10	.493	14.72
10	.516	14.56
10	.539	14.38
5	.549	14.34
5	.558	14.41
5	.568	14.44
10	.588	14.45
10	.611	14.43
10	.633	14.49
10	.659	14.56
10	.685	14.67
10	.709	14.69
10	.725	14.77
10	.753	14.80
10	.771	14.77
10	.791	14.96
10	.809	15.01
10	.825	15.06
10	.848	15.01
10	.866	15.01
10	.891	15.06
10	.910	15.09
10	.926	15.10
10	.948	15.08
10	.970	15.24
10	.987	15.29

14

n	phase	brightness
10	.010	12.96
10	.025	12.98
10	.047	12.99
10	.064	13.33
5	.085	13.37
5	.100	13.37
5	.113	13.37
5	.127	13.35
5	.150	13.35
5	.164	13.28
10	.184	12.99
10	.210	12.96
10	.235	12.92
10	.257	12.93
10	.279	12.95
10	.298	12.93
10	.321	12.91
10	.338	12.93
10	.355	12.94
10	.368	12.92
10	.394	12.92
10	.421	12.91
10	.454	12.93
10	.480	12.91
10	.511	12.91
10	.541	12.91
10	.567	12.89
10	.590	12.90
10	.613	12.92
10	.633	12.92
10	.648	12.90
10	.670	12.93
10	.689	12.91
10	.699	12.92
10	.717	12.92
10	.729	12.93
10	.748	12.91
10	.772	12.93
10	.797	12.91
10	.819	12.91
10	.835	12.93
10	.851	12.90
10	.866	12.92
10	.891	12.93
10	.909	12.94
10	.927	12.91
10	.941	12.92
10	.957	12.91
10	.970	12.93
10	.986	12.90
7	.996	12.95

15

n	phase	brightness
10	.028	13.41
10	.072	13.39
10	.087	13.43
10	.098	13.41
10	.119	13.42
10	.151	13.42
10	.172	13.41
10	.189	13.40
10	.208	13.42
10	.226	13.41
10	.246	13.43
10	.263	13.39
10	.276	13.40
10	.292	13.43
10	.315	13.43
10	.339	13.42
10	.352	13.43
10	.382	13.59
5	.405	14.16

TABLE 4 (continued)

15 (contin.)

n	phase	bright-ness
5	.424	14.38
5	.431	14.40
5	.436	14.40
5	.443	14.40
5	.451	14.36
5	.458	14.13
5	.468	14.08
10	.487	13.49
10	.518	13.41
10	.547	13.42
10	.588	13.41
10	.612	13.43
10	.639	13.39
10	.654	13.37
10	.668	13.40
10	.684	13.40
10	.700	13.47
10	.714	13.39
10	.733	13.41
10	.763	13.39
10	.784	13.41
10	.806	13.41
10	.810	13.42
10	.848	13.41
10	.862	13.43
10	.879	13.45
10	.899	13.43
10	.917	13.43
10	.930	13.42
10	.952	13.42
10	.979	13.42
10	.262	13.18
10	.281	13.19
10	.293	13.19
10	.314	13.21
10	.345	13.18
10	.381	13.18
10	.398	13.22
10	.416	13.19
10	.435	13.19
10	.449	13.21
10	.462	13.16
10	.480	13.17
10	.498	13.18
10	.520	13.16
10	.549	13.17
10	.577	13.17
10	.596	13.19
10	.606	13.21
10	.620	13.15
10	.650	13.17
10	.680	13.19
10	.707	13.20
5	.742	14.38
5	.761	15.13
5	.773	15.13
5	.785	15.02
10	.814	13.18
10	.835	13.18
10	.858	13.18
10	.883	13.17
10	.912	13.20
10	.929	13.23
10	.949	13.18
10	.962	13.14
10	.975	13.17
10	.991	13.18
10	.269	13.80
10	.278	13.70
10	.287	13.75
10	.301	13.74
10	.320	13.79
10	.351	13.75
10	.376	13.81
10	.419	13.86
10	.440	13.65
10	.476	13.79
10	.498	13.78
10	.513	13.73
10	.535	13.72
10	.561	13.78
10	.577	13.79
10	.593	13.72
10	.613	13.72
10	.634	13.77
10	.656	13.76
10	.676	13.74
10	.697	13.75
10	.718	13.83
10	.737	13.83
10	.751	13.87
5	.764	14.14
5	.774	14.64
5	.785	14.79
5	.796	14.74
5	.807	14.64
5	.817	14.46
10	.839	14.04
10	.877	13.77
10	.906	13.71
10	.935	13.73
10	.960	13.78
10	.989	13.74

16			17			18		
n	phase	bright-ness	n	phase	bright-ness	n	phase	bright-ness
10	.017	13.23	10	.013	13.71	5	.003	13.40
10	.033	13.23	10	.038	13.78	5	.008	13.56
10	.049	13.23	10	.059	13.76	5	.030	14.45
10	.064	13.17	10	.080	13.75	5	.040	15.24
10	.076	13.17	10	.099	13.74	5	.049	15.31
10	.093	13.20	10	.116	13.73	5	.058	15.40
10	.107	13.17	10	.128	13.80	5	.070	15.38
10	.125	13.15	10	.142	13.78	5	.078	14.82
10	.143	13.17	10	.156	13.78	5	.085	14.45
10	.162	13.17	10	.174	13.76	5	.091	14.20
10	.178	13.17	10	.194	13.78	5	.095	14.16
10	.202	13.18	10	.216	13.72	5	.100	13.77
10	.236	13.19	10	.243	13.80	5	.104	13.61

TABLE 4 (continued)

18 (contin.)

n	phase	brightness
5	.111	13.37
5	.138	13.36
10	.160	13.36
10	.178	13.35
10	.194	13.34
10	.213	13.42
10	.236	13.34
10	.269	13.29
10	.286	13.31
10	.298	13.32
10	.318	13.28
10	.332	13.33
10	.351	13.37
10	.375	13.40
10	.400	13.33
10	.422	13.35
10	.443	13.27
10	.465	13.33
10	.488	13.42
10	.511	13.34
10	.542	13.38
10	.560	13.36
10	.577	13.36
10	.601	13.34
10	.634	13.32
10	.669	13.33
10	.698	13.34
10	.713	13.35
10	.730	13.35
10	.747	13.33
10	.763	13.34
10	.779	13.33
10	.798	13.35
10	.836	13.33
10	.863	13.35
10	.885	13.37
10	.913	13.32
10	.938	13.37
10	.953	13.43
10	.971	13.30
10	.992	13.36

19

n	phase	brightness
10	.011	12.93
10	.042	12.90
10	.073	12.96
10	.088	12.86
10	.097	12.85
10	.119	13.04
5	.136	13.28
5	.149	13.56
5	.176	14.11
5	.186	14.20
5	.196	14.16
5	.212	13.76
5	.227	13.25
5	.240	13.17
10	.258	12.94
10	.283	12.89
10	.306	12.95
10	.316	12.93
10	.339	12.94
10	.367	12.93
10	.384	12.96
10	.398	12.82
10	.414	12.98
10	.426	12.91
10	.442	12.84
10	.456	12.92
10	.473	12.86
10	.488	12.82
10	.520	12.80
10	.541	12.88
10	.557	12.95
10	.577	12.96
10	.592	12.93
10	.624	12.99
10	.649	12.99
10	.670	12.98
10	.689	13.01
10	.702	13.02
5	.720	13.04
5	.728	12.96
5	.738	12.97
5	.742	12.95
5	.749	12.97
5	.759	12.83
5	.776	12.81
5	.796	12.95
10	.819	12.91
10	.870	12.86
10	.895	12.87
10	.909	12.79
10	.930	12.91
10	.942	12.85
10	.956	12.83
10	.974	12.92
10	.984	12.82
3	.996	12.88

20

n	phase	brightness
10	.020	15.22
10	.059	15.05
10	.086	15.27
10	.124	15.06
5	.149	14.75
5	.174	14.50
5	.192	14.40
5	.202	14.56
5	.210	14.15
5	.228	14.22
5	.236	14.19
5	.246	14.20
5	.263	14.17
5	.269	14.35
5	.284	14.47
5	.297	14.54
5	.305	14.35
5	.321	14.56
5	.334	14.57
10	.355	14.67
10	.390	14.65
10	.434	14.68
10	.488	14.95
10	.542	14.85
10	.593	15.06
10	.639	15.16
10	.665	15.06
10	.690	15.08
10	.711	15.08
10	.728	15.07
10	.750	15.21
10	.775	15.21
10	.807	15.05
10	.847	15.15
10	.900	15.08
10	.944	14.94
12	.984	15.08

TABLE 4 (continued)

	21	
n′	phase	bright-ness
10	.011	13.60
10	.043	13.85
10	.061	13.87
10	.082	14.18
10	.094	14.27
10	.112	14.45
10	.133	14.54
10	.153	14.54
10	.192	14.68
10	.242	14.71
10	.265	14.84
10	.284	14.90
10	.302	14.62
10	.322	14.98
10	.342	14.96
10	.356	14.91
10	.366	14.92
10	.383	14.86
10	.407	14.81
10	.430	14.97
10	.458	14.81
10	.470	15.02
10	.486	15.02
10	.507	15.12
10	.533	14.93
10	.553	14.89
10	.575	14.95
10	.603	14.76
10	.628	14.96
10	.662	14.77
10	.678	14.58
10	.691	14.48
10	.748	13.69
10	.785	13.50
10	.807	13.31
10	.821	13.34
10	.833	13.29
10	.860	13.37
10	.867	13.45
10	.890	13.51
10	.904	13.54
10	.920	13.41
10	.944	13.60
10	.994	13.59

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DISCUSSION OF 12 VARIABLE STARS IN A REGION AROUND $\alpha = 17^h$, $\delta = -70^\circ$

The present paper presents the results of a study of variable stars situated in Ara, Apus and in Triangulum Australe. The investigation is based on 340 plates taken by A.Van Hoof and the first author with the 10-inch Metcalf telescope of the Boyden Observatory at Bloemfontein (South-Africa).

To facilitate the identification of the variables and their comparison stars small charts are shown in Figure 1. These charts cover a field of ±30 minutes of arc square with North on top. Star no.2 is identical with BS Apus and star no.7 is identical with DZ Apus.No chart is given for these variables.

The improved values have been given in Table 1. The mean errors in the sixth column correspond with the last two decimals of the periods.

The periods P in the fifth column were used in deriving the phases according to the formula:

$$\text{Phase} = P^{-1} \times (\text{J.D.Hel.} - 24360000).$$

The brightnesses of the comparison stars have been tabulated in Table 2. The magnitudes have been derived from star-counts, made in a field of $\frac{1}{4}\square^\circ$ around each variable and compared with the tables in Groningen Publication no.43.

The data of the least-square solutions are given in Table 3.

The mean phase, the mean brightness and the numbers of observations for each point of the light curve are given in table 4.

Figure 2 shows the mean light-curves.

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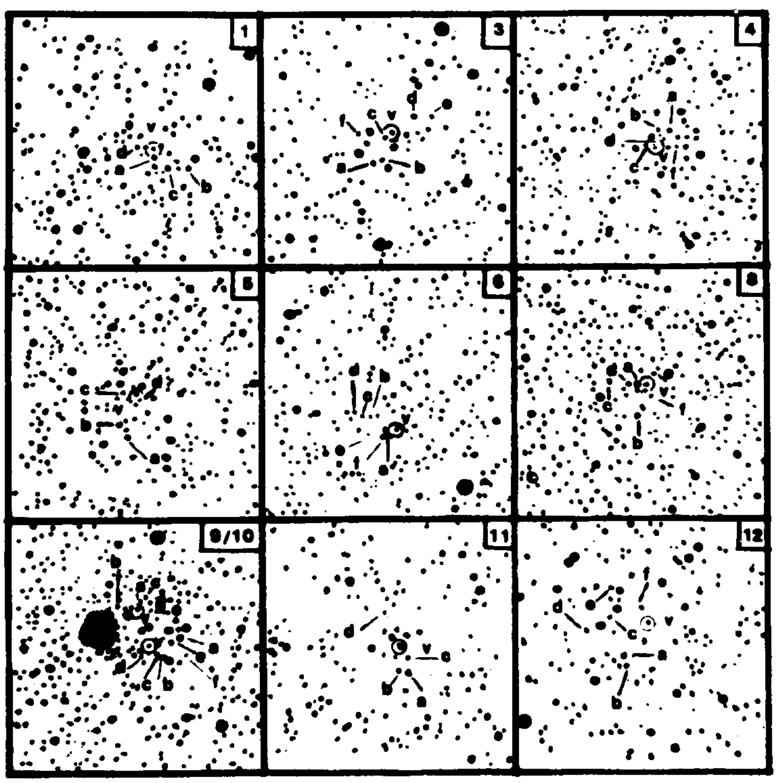


FIG. 1

TABLE 1

x	R.A. (1875)	Dec. (1875)	Type	Period	m.e.	Epoch J.D. 2437 000.^{d} +	m.e. of single epoch	phase of epoch	n of epochs	Brightness max.	Brightness min.	n of estim.	m.e. of single estimate
1	$16^h 05^m 44^s.4$	$-68° 36'.9$	RR	$0^d.4706768$	± 29	$419^d.932$	$\pm 0^d.030$	$.787^P$	22	$13^m.50$	$15^m.13$	220	$\pm .19^m$
2	16 07 17.7	− 71 21.4	RR	0.5825555	± 39	419.947	± 0.041	.446	26	11.80	12.82	286	± .11
3	16 32 20.4	− 71 49.7	RR	0.4757793	± 37	295.980	± 0.024	.910	13	13.49	15.46	305	± .16
4	17 01 29.3	− 67 23.8	RR	0.5868458	± 30	295.672	± 0.020	.857	14	14.18	16.23	249	± .19
5	17 08 00.1	− 70 54.0	RR	0.4709907	± 23	419.638	± 0.024	.152	26	14.13	15.30	340	± .12
6	17 10 28.8	− 67 29.9	RR	0.6284849	± 56	296.086	± 0.029	.238	22	14.16	15.06	275	± .13
7	17 13 30.7	− 73 04.1	RR	0.5520642	± 31	419.714	± 0.027	.647	17	14.30	15.45	315	± .16
8	17 17 16.2	− 72 01.9	RR	0.5633189	± 39	419.946	± 0.030	.678	15	13.85	15.80	327	± .12
9	17 17 58.1	− 66 59.8	RR	0.4558950	± 17	296.031	± 0.011	.829	20	13.98	14.87	306	± .10
10	17 18 17.3	− 66 54.5	RR	0.3814870	± 50	419.997	± 0.038	.270	23	14.33	14.99	269	± .17
11	17 29 00.8	− 70 19.3	RR	0.7550246	± 58	295.613	± 0.046	.987	31	12.66	13.31	314	± .09
12	17 31 51.4	− 67 27.7	RR	0.4871444	± 51	419.991	± 0.020	.928	14	13.30	15.10	225	± .18

TABLE 2

Comparison Stars

Var 1		Var 2		Var 3		Var 4		Var 5		Var 6	
x	m	x	m	x	m	x	m	x	m	x	m
a	13.46	a	11.77	a	13.44	a	14.00	a	14.05	a	14.02
b	14.02	b	12.16	b	13.62	b	14.22	b	14.46	b	14.29
c	14.55	c	12.64	c	13.98	c	14.45	c	15.12	c	14.61
d	15.19	d	12.90	d	14.39	d	15.63	d	15.44	d	14.73
				e	14.78	e	16.33			e	14.90
				f	16.02					f	15.06

Var 7		Var 8		Var 9		Var 10		Var 11		Var 12	
x	m	x	m	x	m	x	m	x	m	x	m
a	14.21	a	13.34	a	13.85	a	14.15	a	12.63	a	13.15
b	14.56	b	13.86	b	14.02	b	14.34	b	12.83	b	13.47
c	14.87	c	14.20	c	14.24	c	14.59	c	13.18	c	13.98
d	15.39	d	14.50	d	14.73	d	14.76	d	13.45	d	14.30
		e	14.76	e	14.83	e	15.15			e	14.82
		f	15.05	f	14.97					f	15.18

T A B L E 3

J.D. max.	t	O - C
Var 1		
d		d
2436 788.240	0	-0.0433
2437 131.395	729	-0.0117
132.334	731	-0.0140
133.265	733	-0.0244
134.296	735	0.0652
135.211	737	0.0389
136.606	740	0.0219
141.283	750	-0.0079
142.216	752	-0.0163
143.213	754	0.0394
157.265	784	-0.0289
164.321	799	-0.0331
190.234	854	-0.0073
437.356	1379	0.0094
469.325	1447	-0.0276
486.324	1483	0.0270
492.421	1496	0.0052
755.536	2055	0.0119
2438 265.251	3138	-0.0160
2439 265.480	5263	0.0249
2440 365.451	7600	0.0243
742.400	8401	-0.0387
Var 2		
2436 095.225	0	0.0088
786.237	1186	0.1100
790.258	1193	0.0531
833.280	1267	-0.0340
836.224	1272	-0.0028
2437 132.205	1780	0.0400
133.265	1782	-0.0651
134.470	1784	-0.0252
136.215	1787	-0.0279
140.264	1794	-0.0568
143.213	1799	-0.0206
437.399	2304	-0.0251
486.369	2388	0.0103
490.424	2395	-0.0126
790.436	2910	-0.0167
793.372	2915	0.0065
2438 178.472	3576	0.0373
262.294	3720	-0.0287
265.251	3725	0.0156
940.413	4884	-0.0043
2439 265.512	5442	0.0288
268.456	5447	0.0600
293.418	5490	-0.0279
2440 338.529	7284	-0.0215
383.362	7361	-0.0453
386.363	7366	0.0430
Var 3		
2436 038.4708	0	-0.0247
041.3205	6	-0.0297
064.2116	54	0.0240
807.3913	1616	0.0364
839.2256	1683	-0.0065
2437 132.2913	2299	-0.0209
133.2650	2301	0.0013
143.2346	2322	-0.0205
162.3264	2362	0.0402
192.2611	2425	0.0008
486.3022	3043	0.0103
2438 262.2937	4674	0.0045
2439 268.5446	6789	-0.0167
Var 4		
2436 046.2808	0	0.0037
100.2682	92	0.0013
110.2463	109	0.0030
806.2442	1295	0.0018
867.2617	1399	-0.0127
894.2590	1445	-0.0103
2437 134.2962	1854	0.0070
135.4686	1856	0.0057
137.2124	1859	-0.0111
138.3800	1861	-0.0172
141.3045	1866	-0.0269
144.2782	1871	0.0126
790.4363	2972	0.0534
2440 365.4514	7360	-0.0107
Var 5		
2436 036.338	0	0.0000
038.253	4	0.0310
046.238	21	0.0092
052.328	34	-0.0237
069.276	70	-0.0313
078.267	89	0.0108
110.267	157	-0.0165
111.224	159	-0.0015
833.280	1692	0.0258
873.280	1777	-0.0084
874.241	1779	0.0106
2437 131.395	2325	0.0037
132.334	2327	0.0007
133.265	2329	-0.0103
136.606	2336	0.0338
141.283	2346	0.0009
142.216	2348	-0.0081
147.372	2359	-0.0330
157.265	2380	-0.0308

T A B L E 3 (continued)

J.D. MAX.	t	0 - C
Var 5 (cont)		
2437 158.251	2382	0.0132
190.257	2450	-0.0081
199.258	2469	0.0440
432.341	2964	-0.0133
439.404	2979	-0.0152
2439 265.500	6856	0.0501
2440 386.373	9236	-0.0348
Var 6		
2436042.2456	0	-0.0126
49.2187	11	0.0472
52.3388	16	0.0249
64.2223	35	-0.0329
69.2650	43	-0.0180
788.2193	1187	-0.0505
871.2852	1319	0.0554
2437128.2809	1728	0.0008
131.4381	1733	0.0156
133.2757	1736	-0.0323
134.5323	1738	-0.0327
135.2110	1739	0.0175
136.4728	1741	0.0224
140.2429	1747	0.0216
145.2574	1755	0.0082
194.2453	1833	-0.0257
439.3712	2223	-0.0090
755.5140	2726	0.0059
760.5020	2734	-0.0339
784.4348	2772	0.0164
2438178.4680	3399	-0.0104
506.5686	3921	0.0211
Var 7		
2436 036.273	0	0.0315
038.465	4	0.0153
041.213	9	0.0030
046.217	18	0.0384
068.236	58	-0.0252
110.225	134	0.0069
2437 134.275	1989	-0.0221
135.404	1991	0.0027
139.289	1998	0.0233
141.433	2002	-0.0410
192.250	2094	-0.0138
432.384	2529	-0.0278
437.388	2538	0.0076
787.374	3172	-0.0151
792.354	3181	-0.0036
2439 268.545	5855	-0.0323
2440 338.529	7793	0.0514

J.D. max.	t	0 -C
Var 8		
2436 035.295	0	-0.0130
066.270	55	-0.0205
097.273	110	0.0000
782.239	1326	-0.0298
839.226	1427	0.0620
845.340	1438	-0.0205
2437 134.339	1951	-0.0041
136.606	1955	0.0096
142.237	1965	0.0075
147.351	1974	0.0516
437.356	2489	-0.0526
758.508	3059	0.0076
784.424	3105	0.0109
2439 235.523	5681	0.0005
2440 386.373	7724	-0.0099
Var 9		
2436026.3572	0	-0.0067
033.2040	15	0.0017
038.2305	26	0.0133
069.2113	94	-0.0067
079.2530	116	0.0053
100.2355	162	0.0166
110.2463	184	-0.0023
782.2389	1658	0.0011
833.2798	1770	-0.0182
839.2256	1783	0.0010
2437131.4381	2424	-0.0152
132.3772	2426	0.0121
133.2650	2428	-0.0119
138.2728	2439	-0.0189
190.2565	2553	-0.0073
432.3514	3084	0.0074
437.3670	3095	0.0082
469.2817	3165	0.0102
793.4144	3876	0.0016
2438265.2721	4911	0.0080
Var 10		
2436035.2278	0	0.0284
038.2526	8	0.0013
041.2560	16	-0.0472
046.2592	29	-0.0034
049.2830	37	-0.0315
051.2559	42	0.0340
064.2545	76	0.0621
067.2404	84	-0.0039
078.2673	113	-0.0402
109.2311	194	0.0232
788,2296	1974	-0.0251

TABLE 3 (continued)

J.D. max.	t	0 - C
Var 10 (cont)		
2436806.2220	2021	0.0374
2437134.2747	2881	0.0113
135.4686	2884	0.0607
136.5372	2887	-0.0152
137.2983	2889	-0.0170
141.4334	2900	-0.0783
143.4493	2905	0.0302
145.2789	2910	-0.0477
169.3242	2973	-0.0360
192.2611	3033	0.0116
790.4685	4601	0.0475
795.3772	4614	-0.0032
Var 11		
2436036.2734	0	0.0417
038.4376	3	-0.0591
042.2349	8	-0.0370
051.2990	20	-0.0332
064.2116	37	0.0440
067.2191	41	0.0314
079.2639	57	-0.0042
110.2250	98	0.0010
788.2400	996	0.0039
874.2409	1110	-0.0680
2437132.4631	1452	-0.0642
133.2650	1453	-0.0173
136.2796	1457	-0.0228
139.2886	1461	-0.0339
158.2510	1486	0.0528
170.3000	1502	0.0214
192.2614	1531	0.0871
195.2564	1535	0.0620
432.3621	1849	0.0900
469.3033	1898	0.0350
490.4343	1926	0.0253
792.3755	2326	-0.0428
795.3879	2330	-0.0504
2438174.4793	2832	0.0183
196.3810	2861	0.0244
258.2287	2943	-0.0412
261.2272	2947	-0.0626
264.2611	2951	-0.0473
2439265.5004	4277	0.0290
268.5130	4281	0.0213
2440390.4547	5767	-0.0030

J.D. max.	t	0 - C
Var 12		
2436786.2366	0	0.0207
803.2432	35	-0.0228
2437134.5215	715	-0.0027
135.4686	717	-0.0298
136.4728	719	0.0001
138.4229	723	0.0016
144.2889	735	0.0219
145.2574	737	0.0161
162.3050	772	0.0136
759.5047	1998	-0.0257
760.4913	2000	-0.0134
2438178.4680	2858	-0.0066
198.4439	2899	-0.0036
262.2936	3030	0.0301

TABLE 4

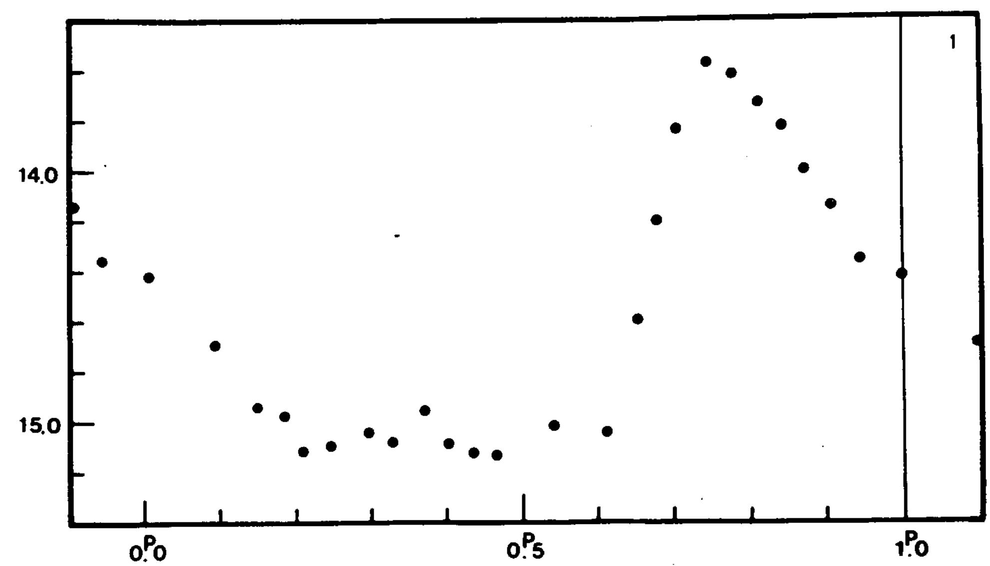
n	phase	m	n	phase	m	n	phase	m	n	phase	m
	Var 1			Var 2 (cont)			Var 3 (cont)			Var 5 (cont)	
	P	m									
10	.005	14.42	10	.735	12.27	5	.933	13.69	5	.165	14.21
10	.092	14.69	10	.755	12.61	5	.959	13.87	5	.177	14.15
10	.148	14.94	10	.786	12.65	5	.987	13.81	5	.196	14.45
10	.184	14.97	10	.815	12.64				5	.212	14.35
10	.208	15.11	10	.849	12.70		Var 4		5	.232	14.42
10	.246	15.09	10	.883	12.72				10	.246	14.58
10	.295	15.04	10	.927	12.74	10	.021	15.43	10	.264	14.57
10	.325	15.09	10	.964	12.82	10	.057	15.45	10	.301	14.73
10	.369	14.95	6	.994	12.72	10	.109	15.69	10	.329	14.80
10	.401	15.08				10	.148	15.79	10	.376	15.04
10	.433	15.12		Var 3		10	.189	16.00	10	.421	14.98
10	.463	15.13				10	.237	16.15	10	.453	15.08
10	.541	15.01	5	.008	13.81	10	.277	16.08	10	.487	15.09
10	.610	15.04	5	.033	14.20	10	.320	16.09	10	.513	15.13
5	.651	14.59	5	.055	14.24	10	.364	16.16	10	.540	15.18
5	.678	14.19	5	.076	14.38	10	.397	16.11	10	.571	15.23
5	.703	13.83	5	.091	14.39	10	.444	16.09	10	.599	15.21
5	.745	13.57	5	.108	14.25	10	.521	16.23	10	.622	15.21
10	.775	13.62	5	.126	14.75	10	.560	16.13	10	.649	15.27
10	.809	13.73	5	.142	14.64	10	.596	16.17	10	.673	15.26
10	.841	13.82	10	.168	14.76	10	.645	16.24	10	.689	15.24
10	.871	14.00	10	.191	14.66	10	.721	16.13	10	.707	15.30
10	.906	14.14	10	.220	14.71	10	.748	15.70	10	.727	15.28
10	.943	14.35	10	.250	14.75	5	.768	15.81	10	.752	15.20
			10	.282	14.84	5	.777	15.30	10	.768	15.23
	Var 2		10	.330	14.90	5	.789	15.06	10	.793	15.26
			10	.365	15.19	5	.807	14.46	10	.821	15.27
10	.024	12.77	10	.395	15.31	5	.818	14.38	10	.854	15.28
10	.060	12.79	10	.434	15.31	5	.826	14.24	10	.901	15.21
10	.098	12.79	10	.464	15.46	5	.837	14.22	10	.937	15.25
10	.133	12.80	10	.492	15.18	5	.855	14.18	10	.966	15.30
10	.176	12.69	10	.522	15.17	5	.868	14.20	10	.992	15.23
10	.220	12.68	10	.542	15.40	5	.882	14.27			
10	.260	12.64	10	.569	15.45	5	.899	14.33		Var 6	
10	.288	12.50	10	.589	15.42	5	.924	14.34			
10	.322	12.17	10	.615	15.34	5	.944	14.50	10	.010	15.06
10	.361	11.97	10	.637	15.17	5	.960	15.54	10	.042	15.06
10	.401	11.80	10	.660	15.29	9	.988	14.90	10	.079	15.04
10	.440	11.86	10	.689	15.36				5	.120	14.90
10	.466	11.88	10	.715	15.41		Var 5		5	.137	14.87
10	.498	12.06	10	.744	15.45				5	.156	14.67
10	.525	11.95	10	.765	15.33	10	.014	15.23	5	.166	14.53
10	.563	12.05	10	.792	14.98	10	.040	15.11	5	.176	14.37
10	.605	12.28	5	.812	14.57	10	.071	14.56	5	.192	14.43
10	.635	12.41	5	.834	14.01	5	.099	14.23	5	.210	14.43
10	.675	12.50	5	.864	13.49	5	.127	14.20	5	.229	14.16
10	.708	12.50	5	.895	13.55	5	.147	14.18	5	.246	14.24

TABLE 4 (continued)

n	phase	m
	Var 6 (con)	
5	.260	14.43
5	.272	14.29
5	.279	14.46
5	.299	14.68
5	.315	14.56
5	.350	14.63
5	.376	14.82
5	.393	14.89
10	.429	14.86
10	.475	14.95
10	.522	15.03
10	.561	14.98
10	.597	15.03
10	.612	15.02
10	.679	15.02
10	.714	15.03
10	.767	15.06
10	.811	15.06
10	.843	15.06
10	.874	15.06
10	.906	15.05
10	.939	15.01
10	.964	15.06
10	.990	15.06
	Var 7	
10	.018	15.39
10	.051	15.36
10	.094	15.39
10	.132	15.36
10	.172	15.41
10	.199	15.39
10	.231	15.40
10	.259	15.41
10	.293	15.38
10	.318	15.40
10	.345	15.40
10	.371	15.39
10	.405	15.41
10	.435	15.39
10	.466	15.32
10	.491	15.11
10	.516	15.11
10	.545	14.93
10	.566	14.54
10	.598	14.40
10	.634	14.32
10	.675	14.44
10	.716	14.56
10	.749	14.60
10	.772	14.71
	Var 7 (con)	
10	.795	14.67
10	.818	14.79
10	.850	15.00
10	.894	15.15
10	.930	15.18
10	.966	15.26
5	.991	15.37
	Var 8	
10	.020	14.54
10	.053	14.68
10	.108	14.67
10	.131	14.65
10	.160	14.66
10	.188	14.72
10	.219	14.70
10	.250	14.78
10	.278	14.71
10	.311	14.71
10	.340	14.71
10	.366	14.75
10	.397	14.77
10	.428	14.73
10	.454	14.76
10	.478	14.71
10	.513	14.70
10	.533	14.60
10	.564	14.45
10	.600	14.22
10	.637	14.00
10	.669	13.99
10	.715	14.11
10	.751	14.11
10	.777	14.06
10	.799	14.24
10	.826	14.28
10	.858	14.42
10	.895	14.36
10	.919	14.38
10	.943	14.41
10	.971	14.55
7	.993	14.62
	Var 9	
10	.012	14.74
10	.060	14.75
10	.101	14.80
10	.139	14.82
10	.195	14.81
10	.227	14.80
	Var 9 (con)	
10	.258	14.81
10	.286	14.85
10	.322	14.84
10	.350	14.84
10	.384	14.84
10	.411	14.84
10	.441	14.84
10	.461	14.85
10	.493	14.84
10	.523	14.83
10	.564	14.83
10	.597	14.83
10	.628	14.84
10	.656	14.84
10	.691	14.87
10	.736	14.79
5	.776	14.30
5	.788	14.15
5	.806	14.01
5	.820	13.98
5	.829	13.98
5	.841	14.14
5	.853	14.04
5	.866	14.11
5	.875	14.29
5	.897	14.25
5	.907	14.46
10	.923	14.54
10	.951	14.66
11	.973	14.67
	Var 10	
10	.023	14.58
10	.058	14.47
10	.089	14.44
10	.121	14.47
10	.159	14.40
10	.190	14.36
10	.224	14.36
10	.257	14.33
10	.296	14.39
10	.333	14.41
10	.364	14.37
10	.398	14.44
10	.434	14.48
10	.468	14.48
10	.509	14.57
10	.544	14.63
10	.587	14.61
10	.626	14.73
10	.660	14.87
	Var 10 (con)	
10	.700	14.90
10	.729	14.88
10	.772	14.89
10	.816	14.99
10	.855	14.93
10	.892	14.88
10	.940	14.71
9	.968	14.68
	Var 11	
5	.006	12.68
5	.016	12.70
5	.032	12.71
5	.041	12.77
5	.047	12.76
5	.059	12.81
5	.076	12.80
5	.092	12.80
10	.116	12.84
10	.145	12.94
10	.196	12?87
10	.241	13.03
10	.276	13.03
10	.300	13.05
10	.326	13.07
10	.353	13.03
10	.381	13.07
10	.404	13.20
10	.432	13.21
10	.468	13.13
10	.524	13.21
10	.556	13.22
10	.588	13.18
10	.619	13.19
10	.652	13.27
10	.676	13.30
10	.706	13.30
10	.728	13.31
10	.750	13.24
10	.781	13.11
10	.824	12.85
5	.857	12.82
5	.879	12.74
5	.896	12.69
5	.912	12.66
5	.933	12.66
5	.943	12.68
5	.957	12.71
9	.979	12.69

TABLE 4 (continued)

n	phase	m
	Var 12	
10	.025	13.68
10	.057	13.94
10	.098	14.01
10	.133	14.24
10	.217	14.56
10	.272	14.85
10	.318	14.89
10	.360	14.93
10	.394	14.93
10	.433	14.94
10	.479	15.08
10	.522	15.09
10	.554	15.06
10	.593	15.07
10	.623	15.06
10	.652	14.97
10	.681	14.99
10	.718	15.05
10	.746	15.07
10	.797	14.80
5	.837	13.95
5	.879	13.37
5	.910	13.30
5	.950	13.38
5	.981	13.52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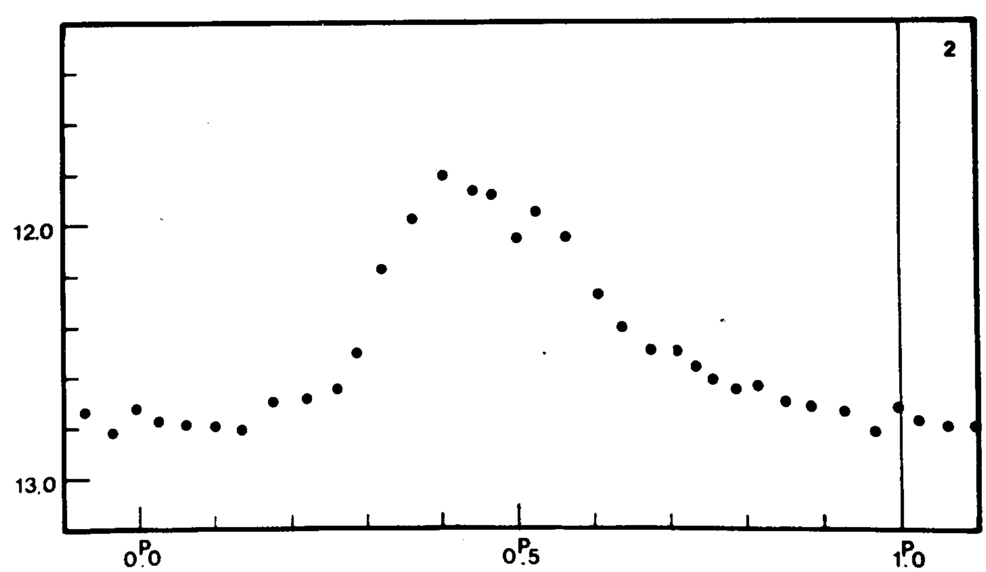
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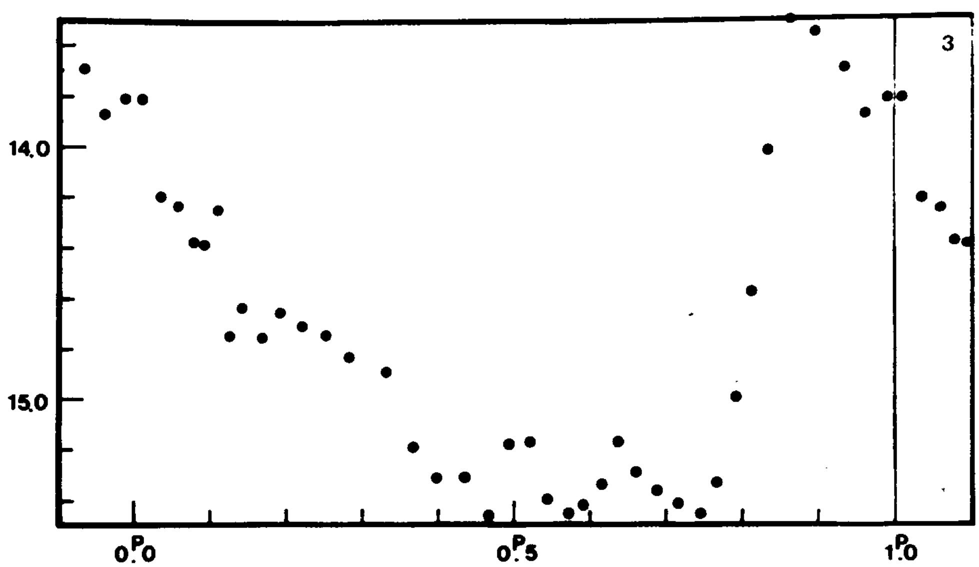
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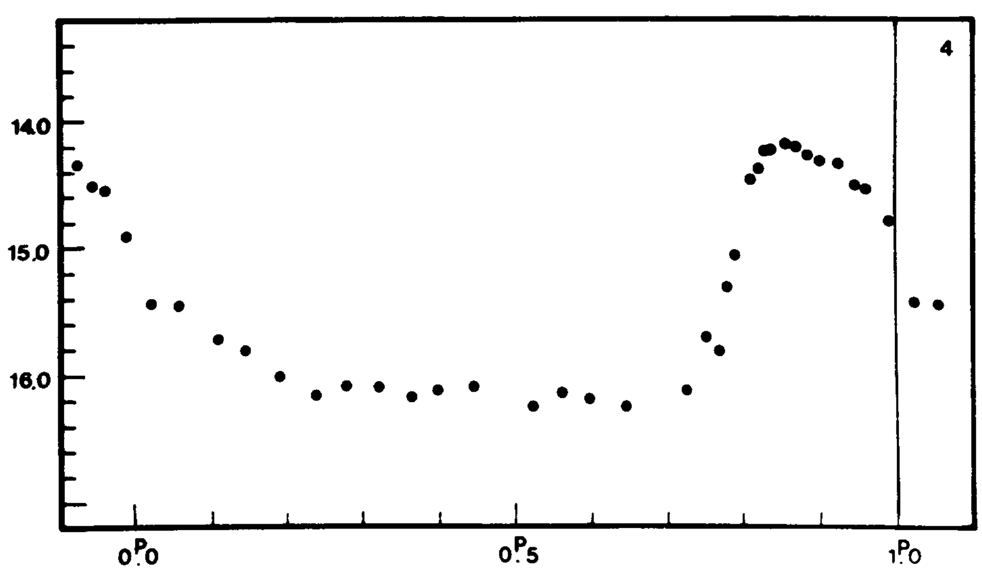
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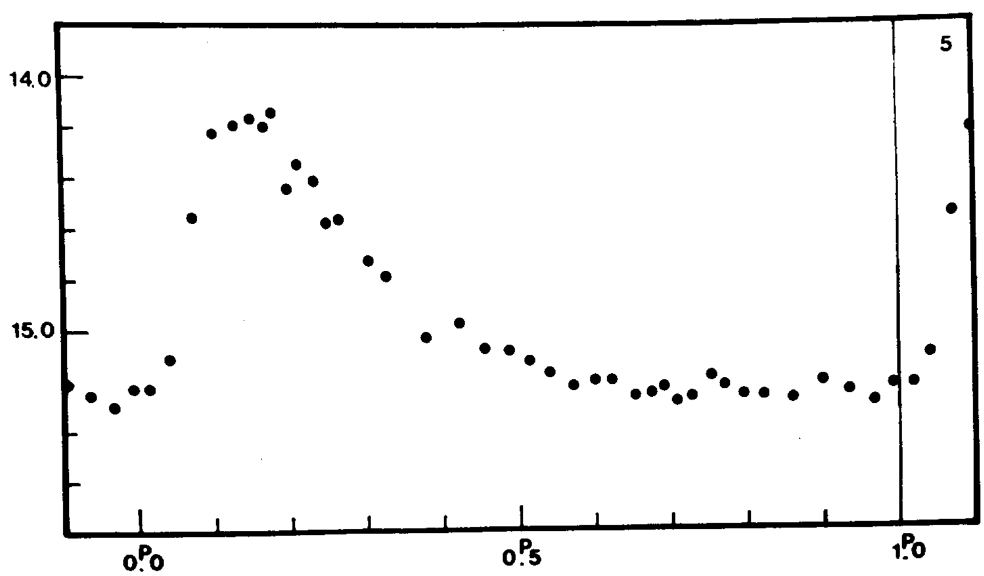
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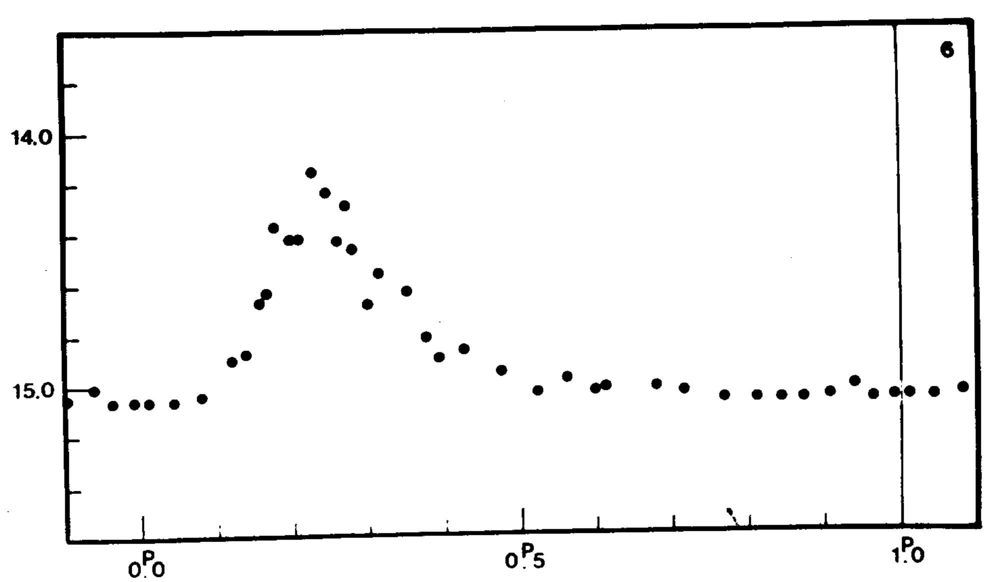
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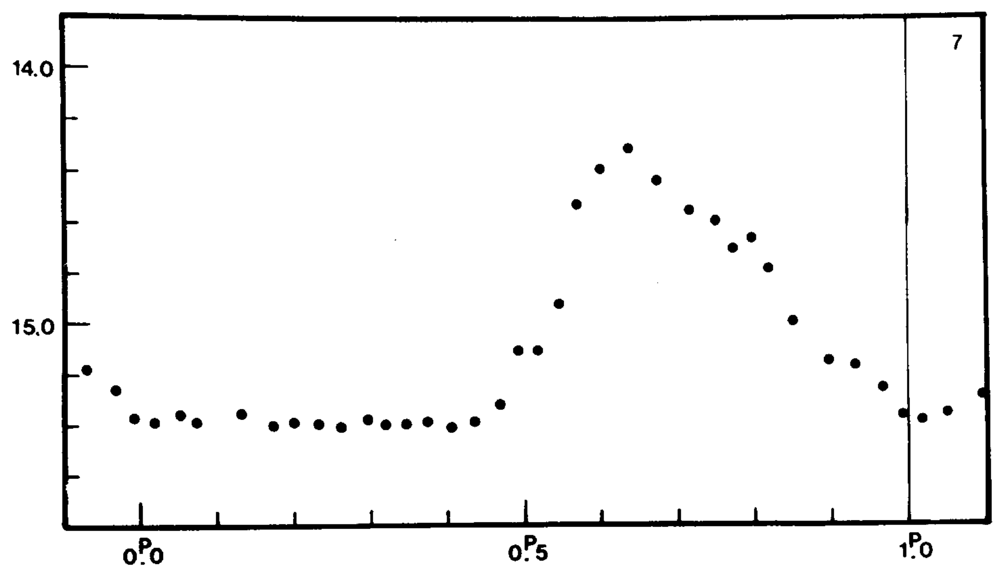
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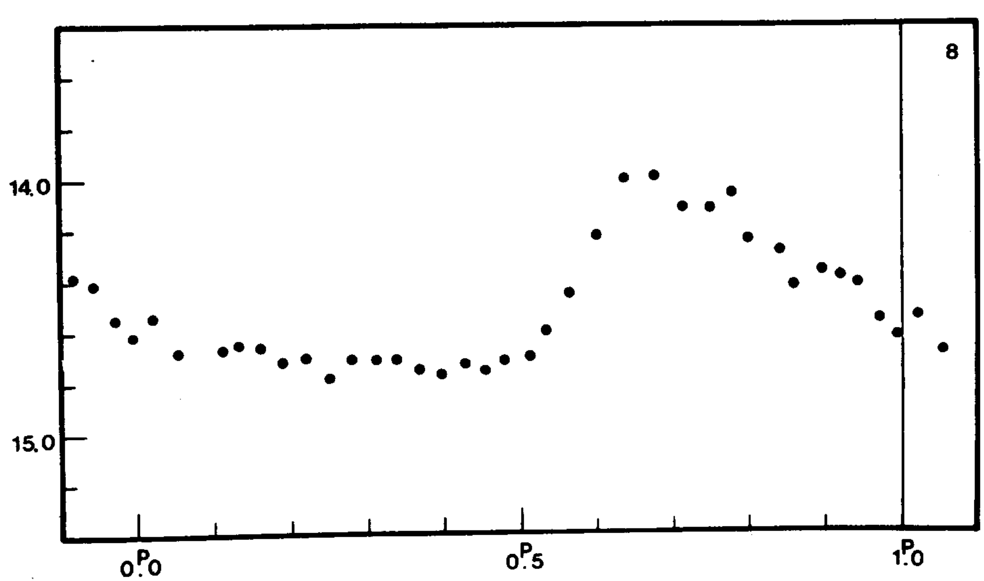
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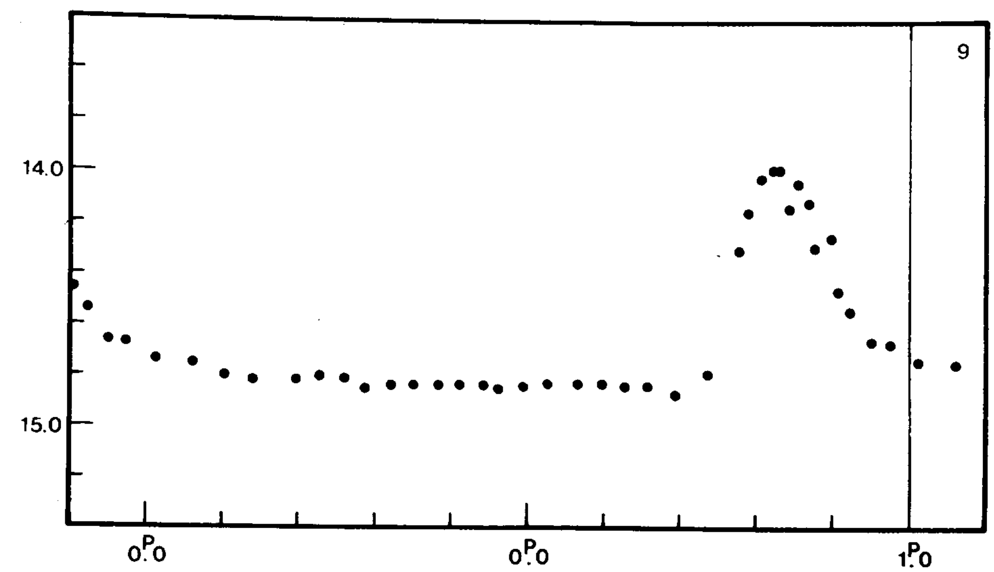
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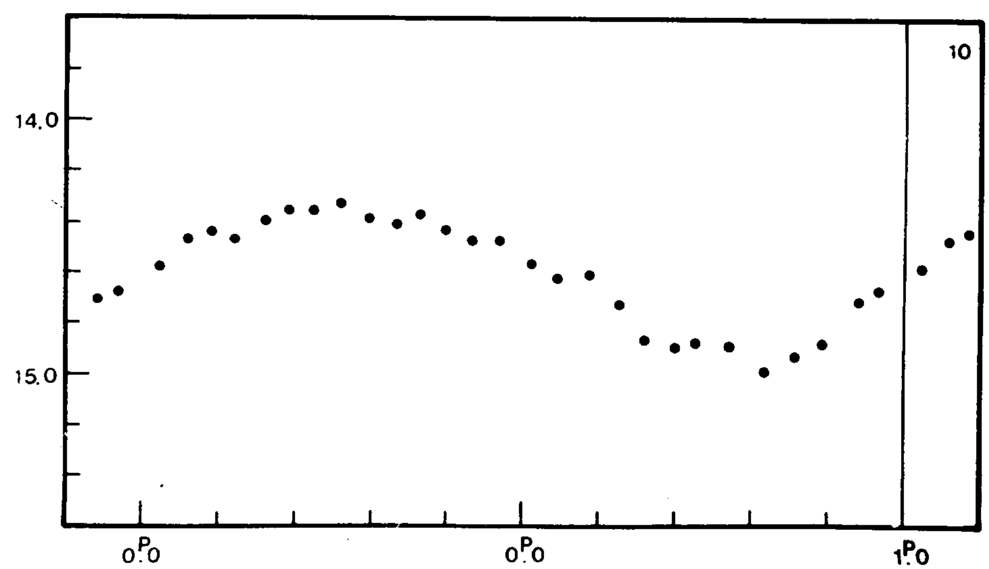
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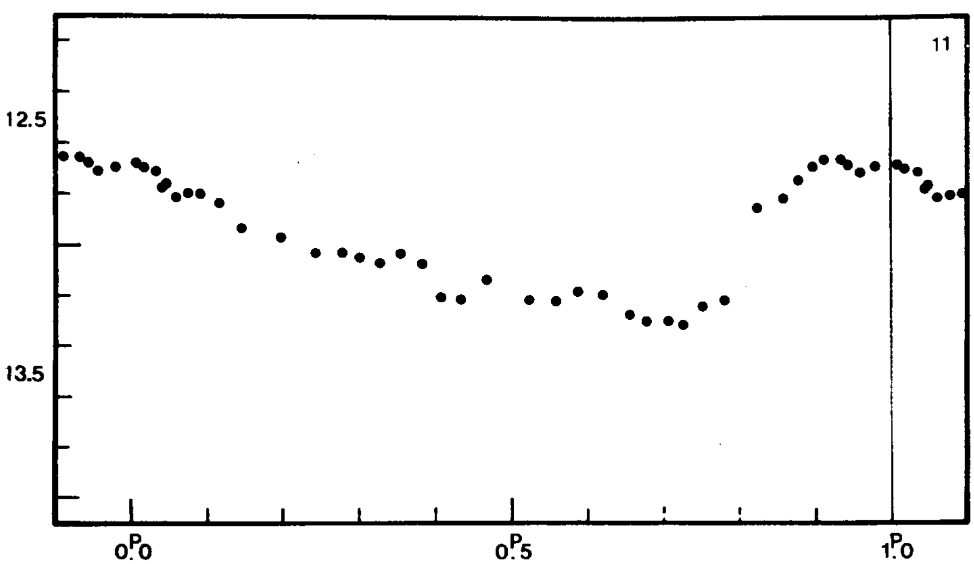
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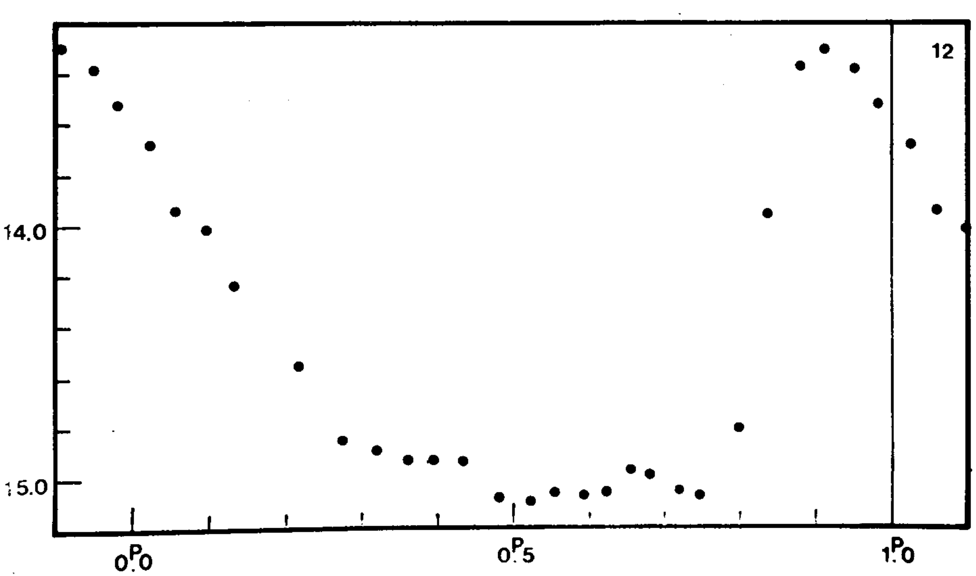
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NUMBER 795

Konkoly Observatory
Budapest
1973 May 21

MINIMA OF ECLIPSING VARIABLES (XI)

This report revives the series of minima of eclipsing variables the last of which was published in IBVS No. 247. Given here are 676 observed heliocentric minima of 48 eclipsing variable stars. All are visual timings reduced by the tracing-paper method, except where noted. Linear elements in the 1969 General Catalogue of Variable Stars were used to compute the O - C values unless otherwise specified. This is a change from previous reports of this series which used the 1958 edition as the prime reference. The number of estimates used for each minimum is given under n.

J.D. hel. (2400000+)	E	O - C	n	Observer
RT Andromedae				
39699.767	10203	+0.009	5	T. Cragg
39772.706	10319	-0.008	20	M. Baldwin
39801.637	10365	-0.008	14	R. Swanberg
39801.640	10365	-0.005	14	M. Baldwin
39813.596	10384	0.000	17	J. Bortle
39813.603	10384	+0.008	17	A. Dobrowski
39821.766	10397	-0.005	17	M. Baldwin
39823.648	10400	-0.010	20	M. Baldwin
39826.799	10405	-0.004	12	M. Baldwin
39828.691	10408	+0.002	9	T. Cragg
39830.584	10411	+0.007	15	Carl Anderson
39833.716	10416	-0.005	12	H. Peterson
39833.717	10416	-0.004	13	H. Swanberg
39847.558	10438	+0.001	14	H. Blake
39862.639	10462	-0.013	7	M. Baldwin
39891.582	10508	-0.001	16	J. Bortle
39908.555	10535	-0.009	13	J. Bortle
40008.557	10694	-0.007	17	A. Dobkowski
40025.562:	10721	+0.017:	15	A. Dobkowski
40030.581	10729	+0.004	15	A. Dobkowski.
40094.724	10831	-0.003	15	M. Baldwin
40096.612	10834	-0.002	16	J. Bortle
40096.619	10834	+0.005	9	L. Hazel
40099.753	10839	-0.006	9	M. Baldwin
40108.556	10853	-0.008	17	J. Bortle
40113.594	10861	-0.001	18	J. Bortle
40113.597	10861	+0.002	13	K. Simons
40116.733	10866	-0.007	14	H. Peterson
40116.736	10866	-0.004	13	M. Baldwin
40118.625	10869	-0.002	19	J. Bortle
40128.686	10885	-0.003	10	M. Baldwin

J.D. hel. (2400000+)	E	O - C	n	Observer
RT Andromedae				
40135.610	10896	+0.002	13	J. Bortle
40145.668	10912	-0.002	13	H. Peterson
40184.661	10974	-0.003	12	M. Baldwin
40196.614	10993	0.000	16	J. Bortle
40208.559	11012	-0.005	19	J. Bortle
40211.704	11017	-0.004	8	M. Baldwin
40245.666	11071	-0.005	9	M. Baldwin
40411.698	11335	-0.010	16	Carl Anderson
40436.865	11375	0.000	15	M. Baldwin
40443.777	11386	-0.007	11	M. Baldwin
40455.727	11405	-0.007	14	Carl Anderson
40457.625	11408	+0.005	12	D. Ortwein
40470.816	11429	-0.012	10	M. Baldwin
40486.563	11454	+0.011	14	D. Ortwein
40491.584	11462	+0.001	13	D. Ortwein
40503.538	11481	+0.005	11	D. Ortwein
40513.591	11497	-0.004	12	J. Bortle
40513.612	11497	+0.017	15	D. Ortwein
40528.683	11521	-0.006	14	M. Baldwin
40547.554	11551	-0.003	14	J. Bortle
40547.557	11551	0.000	15	D. Ortwein
40557.609	11567	-0.012	10	M. Baldwin
40557.618	11567	-0.003	11	R. Swanberg
40562.643	11575	-0.009	8	M. Baldwin
TW Andromedae				
40475.747	4954	+0.013	22	M. Baldwin
40512.860	4963	+0.022	21	M. Baldwin
WZ Andromedae				
39799.591	6791	+0.009	7	D. Livingston
39826.700	6830	-0.014	17	M. Baldwin
39826.705	6830	-0.009	13	F. Chapman
39854.546	6870	+0.006	15	L. Hazel
40116.798	7247	-0.006	12	M. Baldwin
40128.621	7264	-0.009	14	L. Hazel
40151.579	7297	-0.009	19	J. Bortle
40151.583:	7297	-0.005:	11	D. Livingston
40178.718	7336	0.000	11	M. Baldwin
40208.625	7379	-0.006	20	J. Bortle
40215.571:	7389	-0.017:	6	K. Simmons
40436.805	7707	-0.004	14	M. Baldwin
40443.750	7717	-0.015	20	M. Baldwin
40583.576	7918	-0.018	12	L. Hazel
XZ Andromedae				
39801.676	476	-0.001	18	M. Baldwin
39805.747	479	-0.001	14	W. Lowder
39820.677	490	-0.002	14	S. Cook
39820.679	490	0.000	13	H. Blake
49820.679	490	0.000	15	L. Hazel

J.D. hel. (2400000+)	E	O - C	n	Observer
XZ Andromedae				
39839.678	504	-0.003	28	R. Swanberg
39854.610	515	-0.001	23	F. Chapman
39854.610	515	-0.001	11	W. Lowder
39892.614	543	-0.002	11	W. Lowder
39892.616	543	0.000	17	M. Baldwin
39896.687	546	-0.001	21	M. Baldwin
39915.685	560	-0.004	18	R. Swanberg
39915.689	560	-0.001	18	M. Baldwin
40120.635	711	-0.006	15	L. Hazel
40124.711	714	-0.002	14	H. Peterson
40128.782	717	-0.003	20	M. Baldwin
40128.790	717	+0.005	12	L. Hazel
40147.789	731	+0.002	10	T. Cragg
40196.647	767	-0.003	19	J. Bortle
40268.584	820	-0.003	24	J. Bortle
40436.887	944	-0.004	16	M. Baldwin
40447.746	952	-0.004	19	M. Baldwin
40451.815	955	-0.006	15	L. Hazel
40466.748	966	-0.004	26	M. Baldwin
40470.820	969	-0.004	20	M. Baldwin
40512.898	1000	-0.002	12	M. Baldwin
40538.685	1019	-0.004	10	L. Hazel
40557.684	1033	-0.006	10	M. Baldwin
40557.689	1033	-0.002	16	R. Swanberg
40587.542	1055	-0.009	10	L. Hazel
AB Andromedae				
39772.673	11037	+0.011	10	M. Baldwin
39786.617	11079	+0.016	9	W. Lowder
39787.612	11082	+0.015	9	W. Lowder
39790.599	11091	+0.015	10	H. Blake
39793.585	11100	+0.014	17	F. Chapman
39793.589	11100	+0.018	21	D. Livingston
39793.602:	11100	+0.031:	14	H. Blake
39793.745	11100.5	+0.008	15	F. Chapman
39794.574:	11103	+0.008:	9	H. Blake
39794.575	11103	+0.009	22	F. Chapman
39797.729	11112.5	+0.009	16	M. Baldwin
39799.559	11118	+0.014	11	J. Bortle
39800.551	11121	+0.011	14	J. Bortle
39800.717	11121.5	+0.010	17	M. Baldwin
39801.717	11124.5	+0.015	10	M. Baldwin
39820.637	11181.5	+0.017	14	J. Bortle
39821.627	11184.5	+0.011	6	M. Baldwin
39822.613:	11187.5	+0.001:	14	A. Dobkowski
39822.626	11187.5	+0.014	15	J. Bortle
39823.601	11190.5	-0.006	16	C. Ricker
39823.619	11190.5	+0.012	10	M. Baldwin
39826.603	11199.5	+0.009	5	M. Baldwin
39829.590	11208.5	+0.009	15	F. Chapman

J.D. hel. (2400000+)	E	O - C	n	Observer
AB Andromedae				
39829.592	11208.5	+0.011	11	J. Bortle
39842.537	11247.5	+0.012	11	J. Bortle
39844.533	11253.5	+0.017	9	J. Bortle
39845.527	11256.5	+0.015	10	J. Bortle
39845.534	11256.5	+0.022	19	D. Livingston
39848.516	11265.5	+0.017	15	D. Livingston
39851.659	11275	+0.007	13	J. Bortle
39851.659	11275	+0.007	14	M. Baldwin
39854.660	11284	+0.021	10	H. Peterson
39855.660	11287	+0.025	19	H. Peterson
39859.630	11299	+0.012	8	M. Baldwin
39861.618	11305	+0.009	13	J. Bortle
39862.616	11308	+0.012	15	H. Peterson
39867.586	11323	+0.003	24	A. Dobkowski
39867.588	11323	+0.005	16	F. Chapman
39876.541	11350	-0.003	16	A. Dobkowski
39877.550	11353	+0.011	13	J. Bortle
39882.530	11368	+0.012	11	J. Bortle
39885.684	11377.5	+0.013	6	T. Cragg
39890.645	11392.5	-0.004	17	A. Dobkowski
40056.772	11893	+0.011	14	M. Baldwin
40058.765	11899	+0.013	14	M. Baldwin
40059.761	11902	+0.014	11	M. Baldwin
40063.742	11914	+0.011	11	M. Baldwin
40064.737	11917	+0.011	12	M. Baldwin
40069.719	11932	+0.015	8	M. Baldwin
40070.714	11935	+0.014	8	M. Baldwin
40080.673	11965	+0.017	13	J. Bortle
40081.670	11968	+0.018	13	J. Bortle
40084.653	11977	+0.014	12	J. Bortle
40087.642	11986	+0.016	15	J. Bortle
40094.779	12007.5	+0.017	8	M. Baldwin
40095.606	12010	+0.014	16	J. Bortle
40096.601	12013	+0.014	15	J. Bortle
40103.573	12034	+0.016	13	J. Bortle
40116.681	12073.5	+0.014	7	M. Baldwin
40117.688	12076.5	+0.026	16	H. Peterson
40128.637	12109.5	+0.022	17	J. Bortle
40128.796	12110	+0.015	9	M. Baldwin
40134.606	12127.5	+0.017	17	J. Bortle
40135.600	12130.5	+0.015	17	J. Bortle
40137.592	12136.5	+0.016	14	J. Bortle
40146.716	12164	+0.013	11	H. Peterson
40156.676	12194	+0.016	13	M. Baldwin
40157.675	12197	+0.019	15	J. Bortle
40160.658	12206	+0.016	19	J. Bortle
40161.653	12209	+0.015	19	J. Bortle
40180.569	12266	+0.013	15	J. Bortle
40181.561	12269	+0.009	14	J. Bortle
40187.707	12287.5	+0.016	18	H. Peterson

J.D. hel. (2400000+)	E	O - C	n	Observer
AB Andromedae				
40196.666	12314.5	+0.013	16	J. Bortle
40197.664	12317.5	+0.015	16	J. Bortle
40200.652	12326.5	+0.016	16	J. Bortle
40208.614	12350.5	+0.013	19	J. Bortle
40215.588:	12371.5	+0.017:	5	K. Simmons
40219.563	12383.5	+0.010	10	K. Simmons
40220.563	12386.5	+0.014	13	J. Bortle
40256.559	12495	0.000	15	A. Dobkowski
40436.789	13038	+0.013	11	M. Baldwin
40437.780	13041	+0.008	10	T. Cragg
40443.763	13059	+0.017	13	M. Baldwin
40447.745	13071	+0.016	11	M. Baldwin
40449.734	13077	+0.014	11	M. Baldwin
40451.732	13083	+0.021	11	M. Baldwin
40457.701	13101	+0.016	9	M. Baldwin
40470.810	13140.5	+0.015	10	M. Baldwin
40471.806	13143.5	+0.015	6	M. Baldwin
40478.599	13164	+0.005	15	D. Ortwein
40483.590	13179	+0.017	9	J. Bortle
40513.619	13269.5	+0.010	17	F. Chapman
40513.624	13269.5	+0.015	10	M. Baldwin
40528.723	13315	+0.013	10	M. Baldwin
40556.604	13399	+0.015	12	M. Baldwin
RY Aquarii				
40446.811	3343	-0.062	13	R. Monske
40454.688	3347	-0.051	14	L. Hazel
40456.674	3348	-0.032	20	R. Monske
CX Aquarii				
39732.760	5898	+0.004	12	T. Cragg
40094.710	6549	+0.008	8	M. Baldwin
40099.715	6558	+0.009	9	M. Baldwin
40113.615	6583	+0.009	17	K. Simmons
40129.731	6612	+0.002	12	M. Baldwin
40178.661	6700	+0.004	11	M. Baldwin
40437.753	7166	+0.007	13	T. Cragg
40446.649	7182	+0.007	12	R. Monske
40447.760	7184	+0.007	15	M. Baldwin
40456.656	7200	+0.007	16	R. Monske
40457.766	7202	+0.005	11	M. Baldwin
OO Aquilae				
39659.743	11315	-0.002	15	Curtis Anderson
39661.775	11319	+0.003	13	Curtis Anderson
39678.739	11352.5	-0.010	10	Curtis Anderson
39685.846:	11366.5	+0.001:	9	Curtis Anderson
39694.709	11384	-0.004	10	M. Baldwin

J.D. hel. (2400000+)	E	O - C	n	Observer
OO Aquilae				
39696.738	11388	-0.002	11	Curtis Anderson
39699.779	11394	-0.003	6	T. Cragg
39699.786	11394	+0.004	11	Curtis Anderson
39701.805	11398	-0.004	10	M. Baldwin
39715.750	11425.5	+0.004	11	S. Cook
39729.676	11453	-0.007	8	Curtis Anderson
39730.685	11455	-0.011	10	Curtis Anderson
39734.746	11463	-0.005	9	Curtis Anderson
39737.783	11469	-0.008	14	M. Baldwin
39743.625	11480.5	+0.006	11	Curtis Anderson
39757.808	11508.5	-0.001	11	M. Baldwin
39764.659	11522	+0.007	10	Curtis Anderson
39765.658	11524	-0.006	10	Curtis Anderson
39800.623	11593	-0.010	11	M. Baldwin
39801.637	11595	-0.010	15	M. Baldwin
40046.677	12078.5	-0.005	9	Curtis Anderson
40047.688	12080.5	-0.008	13	Curtis Anderson
40048.701	12082.5	-0.008	11	Curtis Anderson
40052.751	12090.5	-0.012	7	Curtis Anderson
40053.771	12092.5	-0.006	11	T. Cragg
40054.782	12094.5	-0.008	6	T. Cragg
40056.811	12098.5	-0.006	13	M. Baldwin
40058.834	12102.5	-0.011	14	M. Baldwin
40066.681	12118	-0.019	14	Curtis Anderson
40066.686	12118	-0.014	12	R. Monske
40067.702	12120	-0.012	13	R. Monske
40069.728	12124	-0.013	10	M. Baldwin
40070.740	12126	-0.015	15	M. Baldwin
40081.648	12147.5	-0.003	24	J. Bortle
40096.588	12177	-0.013	18	J. Bortle
40113.575	12210.5	-0.004	10	K. Simmons
40115.596	12214.5	-0.010	16	J. Bortle
40126.748	12236.5	-0.007	8	T. Cragg
40128.775	12240.5	-0.008	14	M. Baldwin
40134.605	12252	-0.006	19	J. Bortle
40151.580	12285.5	-0.008	15	J. Bortle
40156.644	12295.5.	-0.012	14	M. Baldwin
40417.648	12810.5	-0.007	15	J. Bortle
40418.660	12812.5	-0.009	5	W. Hampton
40418.660	12812.5	-0.009	14	J. Bortle
40439.667	12854	-0.033	11	R. Monske
40442.722	12860	-0.019	12	M. Baldwin
40443.736	12862	-0.019	13	M. Baldwin
40447.780	12870	-0.029	14	M. Baldwin
40453.625	12881.5	-0.012	14	Carl Anderson
40454.639	12883.5	-0.012	13	J. Bortle
40455.655	12885.5	-0.010	10	R. Monske
40455.661	12885.5	-0.004	9	W. Hampton

J.D. hel. (2400000+)	E	O - C	n	Observer
V342 Aquilae				
39674.630 1)	1192	+0.006	16	M. Baldwin
39701.751	1200	-0.001	26	M. Baldwin
40525.758: 2)	1443	+0.003:	5	T. Cragg
V343 Aquilae				
40084.710	6311	+0.004	18	L. Hazel
V346 Aquilae				
39706.757	7572	-0.012	8	T. Cragg
40070.760	7901	-0.003	16	M. Baldwin
40454.667	8248	-0.004	16	J. Bortle
40455.775	8249	-0.003	15	R. Monske
40465.721	8258	-0.014	15	T. Cragg
40465.728	8258	-0.007	16	M. Baldwin
40475.686	8267	-0.007	11	M. Baldwin
WW Aurigae				
39828.744	2726	+0.003	10	S. Cook
39852.724	2735.5	-0.005	6	T. Cragg
39852.7308	2735.5	+0.0014	20pe	L. Kalish
39857.7790	2737.5	-0.0004	28pe	L. Kalish
39876.723	2745	+0.006	11	S. Cook
39890.618	2750.5	+0.014	16	M. Baldwin
39905.753	2756.5	-0.002	9	S. Cook
39910.766:	2758.5	-0.039:	5	T. Cragg
39919.658	2762	+0.015	11	S. Cook
40184.781:	2867	+0.011:	18	R. Nolthenius
40186.037:	2867.5	+0.005:	16	R. Nolthenius
40203.707	2874.5	0.000	15	R. Nolthenius
40208.751:	2876.5	-0.006:	20	M. Baldwin
40208.765:	2876.5	+0.008:	15	R. Nolthenius
40213.816:	2878.5	+0.009:	15	R. Nolthenius
40227.657	2884	-0.038	14	T. Cragg
40251.688:	2893.5	+0.006:	14	R. Nolthenius
40280.719	2905	-0.001	15	M. Baldwin
40289.559	2908.5	+0.001	19	J. Bortle
40318.591	2920	-0.005	12	J. Bortle
40554.683	3013.5	-0.002	15	M. Baldwin
40583.716	3025	-0.006	17	M. Daw
40583.717	3025	-0.005	15	J. Green
40583.722	3025	0.000	14	R. Sweetsir
40583.724	3025	+0.002	12	D. Ortwein
AR Aurigae				
39859.657	3172.5	+0.012	12	M. Baldwin
39890.680	3180	+0.026	17	M. Baldwin
39892.738	3180.5	+0.016	14	M. Baldwin
40539.821	3337	+0.024	20	M. Baldwin

J.D. hel. (2400000+)	E	O - C	n	Observer
Y Camelopardalis				
39940.594	1221	+0.011	14	J. Bortle
SV Cameloperdalis				
39635.802	9878	+0.014	12	Curtis Anderson
39647.654	9898	+0.005	29	D. Livingston
39692.732	9974	+0.010	12	Curtis Anderson
39772.785	10109	-0.002	10	M. Baldwin
39794.731	10146	0.000	11	F. Sanner
39797.701	10151	+0.005	14	M. Baldwin
39800.657	10156	-0.005	17	M. Baldwin
39800.667	10156	+0.005	13	F. Sanner
39803.627	10161	0.000	13	F. Sanner
39803.629	10161	+0.002	9	W. Hampton
39803.634	10161	+0.007	17	J. Bortle
39820.829	10190	+0.003	12	F. Sanner
39822.611	10193	+0.005	19	J. Bortle
39826.756	10200	-0.001	13	M. Baldwin
39835.652	10215	-0.001	11	S. Cook
39844.546	10230	-0.003	27	A. Dobkowski
39844.552	10230	+0.003	14	J. Bortle
39848.712	10237	+0.012	13	S. Cook
39851.665	10242	-0.001	14	M. Baldwin
39854.619	10247	-0.012	11	F. Sanner
39854.634	10247	+0.003	10	S. Cook
39857.597	10252	+0.001	13	F. Sanner
39861.751	10259	+0.003	12	F. Sanner
39861.754	10259	+0.006	8	M. Baldwin
39880.732	10291	+0.005	10	S. Cook
39892.593	10311	+0.005	17	J. Bortle
39895.544	10316	-0.009	18	A. Dobkowski
39896.749	10318	+0.009	11	M. Baldwin
39908.608	10338	+0.007	19	J. Bortle
39911.567	10343	+0.001	14	A. Dobkowski
39912.756	10345	+0.004	13	M. Baldwin
39915.717	10350	-0.001	18	M. Baldwin
39918.688	10355	+0.005	15	S. Cook
39918.689	10355	+0.006	15	M. Baldwin
39921.649	10360	0.000	17	A. Dobkowski
39927.581	10370	+0.002	15	J. Bortle
39934.701	10382	+0.005	14	S. Cook
39937.664	10387	+0.003	11	M. Baldwin
39940.624	10392	-0.003	13	F. Sanner
39940.629	10392	+0.002	18	J. Bortle
39943.586	10397	-0.006	13	F. Sanner
39946.569	10402	+0.011	15	J. Bortle
39962.564	10429	-0.006	17	A. Dobkowski
39969.690	10441	+0.003	9	S. Cook
39972.649	10446	-0.004	19	F. Chapman
39994.600	10483	+0.004	10	W. Hampton

J.D. hel. (2400000+)	E	O - C	n	Observer
SV Camelopardalis				
40013.584	10515	+0.009	13	J. Bortle
40080.590	10628	-0.001	14	J. Bortle
40096.605	10655	+0.001	17	J. Bortle
40112.619	10682	+0.001	19	J. Bortle
40115.586	10687	+0.003	19	J. Bortle
40116.772	10689	+0.003	16	M. Baldwin
40118.551	10692	+0.003	17	J. Bortle
40125.671	10704	+0.006	11	M. Baldwin
40128.629	10709	-0.002	12	M. Baldwin
40128.633:	10709	+0.002:	19	J. Bortle
40134.566	10719	+0.005	19	J. Bortle
40147.613	10741	+0.004	19	J. Bortle
40160.662	10763	+0.006	19	J. Bortle
40186.758	10807	+0.007	16	M. Baldwin
40208.700	10844	+0.005	18	M. Baldwin
40211.664	10849	+0.004	13	M. Baldwin
40220.555	10864	-0.001	16	J. Bortle
40227.680:	10876	+0.007:	9	T. Cragg
40278.678	10962	+0.001	9	M. Baldwin
40306.542	11009	-0.010	13	A. Dobkowski
40319.598	11031	-0.002	17	J. Bortle
40323.753	11038	+0.002	12	M. Baldwin
40332.653	11053	+0.006	18	R. Sweetsir
40332.654	11053	+0.007	21	J. Bortle
40338.582	11063	+0.004	15	J. Bortle
40339.772	11065	+0.008	14	R. Sweetsir
40348.663	11080	+0.003	18	J. Bortle
40380.691	11134	+0.005	20	J. Bortle
40447.704	11247	+0.001	10	M. Baldwin
40466.680	11279	-0.002	13	M. Baldwin
40470.837	11286	+0.004	10	M. Baldwin
40510.568	11353	0.000	13	J. Bortle
40561.572	11439	-0.001	11	J. Bortle
AL Camelopardalis				
40296.590	10453	-0.002	23	J. Bortle
40369.652	10508	+0.002	18	J. Bortle
40373.635	10511	0.000	18	J. Bortle
40454.660	10572	-0.003	16	J. Bortle
R Canis Majoris				
39822.846	3792	+0.007	14	F. Sanner
39863.738	3828	+0.005	18	F Sanner
39870.531	3834	-0.018	21	A. Dobkowski
39872.817	3836	-0.003	6	S. Cook
39896.670	3857	-0.005	21	M. Baldwin
39904.632	3864	+0.005	19	J. Bortle
39905.772	3865	+0.010	9	S. Cook

J.D. hel. (2400000+)	E	O - C	n	Observer
39912.577	3871	-0.001	18	R. Thompson
39912.592	3871	+0.014	15	J. Bortle
39912.5843 3)	3871	+0.0060	59pe	A. Stokes
39929.637	3886	+0.019	14	R. Sweetsir
39954.596	3908	-0.012	15	A. Dobkowski
40288.578	4202	+0.004	12	J. Bortle
40313.571	4224	+0.007	14	R. Sweetsir
40582.783	4461	+0.001	7	R. Sweetsir
RZ Cassiopeiae				
39694.646	2134	0.000	12	M. Baldwin
39701.810	2140	-0.008	15	M. Baldwin
39737.675	2170	0.000	12	M. Baldwin
39768.752	2196	+0.001	19	F. Sanner
39774.723	2201	-0.004	16	F. Sanner
39793.849	2217	-0.003	17	F. Sanner
39810.587	2231	+0.002	19	J. Bortle
39817.750	2237	-0.006	15	S. Cook
39822.545	2241	+0.008	16	F. Sanner
39830.892:	2248	-0.012:	8	T. Cragg
39835.673	2252	-0.012	10	T. Cragg
39835.686	2252	+0.001	14	S. Cook
39847.640	2262	+0.002	21	R. Swanberg
39856.005	2269	0.000	15	F. Sanner
39859.591	2272	+0.001	8	M. Baldwin
39860.776	2273	-0.009	13	F. Sanner
39860.784	2273	-0.001	11	S. Cook
39872.740	2283	+0.002	12	S. Cook
39878.712	2288	-0.003	13	S. Cook
39884.685	2293	-0.005	14	S. Cook
39884.689	2293	-0.001	9	T. Cragg
39884.692	2293	+0.002	16	M. Baldwin
39890.665	2298	-0.002	20	D. Lucas
39890.669	2298	+0.002	24	M. Baldwin
39896.647	2303	+0.004	18	M. Baldwin
39902.605	2308	-0.014	13	A. Dobkowski
39908.585	2313	-0.011	19	R. Thompson
39908.598	2313	+0.002	19	J. Bortle
39915.766	2319	-0.001	18	M. Baldwin
39945.642	2344	-0.006	17	F. Sanner
39945.646	2344	-0.002	28	R. Thompson
39957.582	2354	-0.019	14	A. Dobkowski
39963.577	2359	0.000	19	T. Balonek
40037.682	2421	0.000	19	T. Balonek
40056.807	2437	+0.001	20	M. Baldwin
40080.707	2457	-0.004	20	T. Balonek
40098.639	2472	-0.001	19	J. Bortle
40098.641	2472	+0.001	18	T. Balonek

J.D. hel. (2400000+)	E	O - C	n	Observer
RZ Cassiopeiae				
40098.649	2472	+0.009	13	L. Hazel
40116.575	2487	+0.007	10	A. Heasley
40117.764:	2488	0.000:	7	R. Nolthenius
40129.715	2498	-0.001	16	R. Swanberg
40129.720	2498	+0.004	20	M. Baldwin
40147.647	2513	+0.002	13	L. Hazel
40147.649	2513	+0.004	14	M. Baldwin
40178.720	2539	-0.001	18	R. Nolthenius
40178.722	2539	+0.001	18	M. Baldwin
40184.699	2544	+0.001	16	R. Swanberg
40196.6523	2554	+0.0024	21pe	H. Landis
40196.654	2554	+0.004	19	J. Bortle
40202.6291	2559	+0.0029	17pe	H. Landis
40208.6055	2564	+0.0031	23pe	H. Landis
40208.609	2564	+0.007	19	J. Bortle
40220.550	2574	-0.005	11	K. Simmons
40220.557	2574	+0.002	19	J. Bortle
40227.732	2580	+0.005	17	T. Cragg
40233.712	2585	+0.009	20	R. Sweetsir
40245.658	2595	+0.003	16	M. Baldwin
40270.760	2616	+0.005	21	M. Baldwin
40282.710	2626	+0.002	14	T. Cragg
40294.664	2636	+0.003	16	M. Baldwin
40318.568	2656	+0.003	9	J. Bortle
40429.707:	2749	-0.016:	25	R. Swanberg
40429.722	2749	-0.001	19	T. Balonek
40436.897	2755	+0.003	18	M. Baldwin
40442.874	2760	+0.003	15	M. Baldwin
40447.650	2764	-0.002	18	R. Balonek
40453.624	2769	-0.004	21	T. Balonek
40453.629	2769	+0.001	15	L. Hazel
40453.633	2769	+0.005	22	Carl Anderson
40454.820	2770	-0.003	18	T. Balonek
40454.822	2770	-0.001	13	R. Sweetsir
40466.776	2780	0.000	19	M. Baldwin
40502.635	2810	+0.002	17	D. Ortwein
40533.713	2836	+0.003	17	J. Green
40533.713	2836	+0.003	18	R. Sweetsir
40539.687	2841	+0.001	13	M. Baldwin
40557.6139	2856	-0.0007	11pe	H. Landis
40557.614	2856	0.000	15	R. Swanberg
40557.615	2856	+0.001	12	M. Baldwin
TV Cassiopeiae				
39831.682	10876	-0.013	12	S. Cook
39851.626	10887	-0.007	12	S. Cook
39860.675	10892	-0.022	13	S. Cook
39869.747	10897	-0.013	12	S. Cook
40161.580	11058	-0.010	22	J. Bortle

J.D. hel. (2400000+)	E	O - C	n	Observer
TV Cassiopeiae				
40219.591	11090	-0.002	11	K. Simmons
40219.599	11090	+0.006	13	R. Sweetsir
40228.657	11095	+0.001	16	T. Cragg
40248.586	11106	-0.009	18	J. Bortle
40585.732:	11292	-0.009:	18	T. Cragg
ZZ Cassiopeiae				
40418.658	5614	+0.002	17	J. Bortle
AB Cassiopeiae				
39734.678	4476	+0.009	18	L. Hazel
39801.654	4525	+0.008	22	M. Baldwin
39917.836	4610	+0.006	9	M. Baldwin
40125.604	4762	+0.008	12	L. Hazel
40129.705	4765	+0.009	18	M. Baldwin
40151.577	4781	+0.011	23	J. Bortle
40211.718	4825	+0.009	23	M. Baldwin
40233.588	4841	+0.010	19	J. Bortle
40274.592	4871	+0.007	20	J. Bortle
40278.693	4874	+0.008	13	M. Baldwin
40289.628	4882	+0.008	14	J. Bortle
40293.732	4885	+0.010	13	M. Baldwin
40323.800	4907	+0.008	16	M. Baldwin
40412.651	4972	+0.012	14	J. Bortle
40442.719	4994	+0.008	13	M. Baldwin
40446.814	4997	+0.003	17	R. Monske
40453.646	5002	+0.001	14	L. Hazel
40457.757	5005	+0.011	11	M. Baldwin
40468.691	5013	+0.009	13	M. Baldwin
40554.804	5076	+0.009	19	M. Baldwin
40561.640	5081	+0.011	16	J. Bortle
40572.573	5089	+0.009	14	J. Bortle
40587.607	5100	+0.007	12	L. Hazel
IV Cassiopeiae				
40097.716	8672	+0.027	14	L. Hazel
U Cephei				
39834.688	619	-0.006	15	S. Cook
39839.674	621	-0.007	13	S. Cook
39844.666	623	0.000	15	S. Cook
39849.650	625	-0.002	20	S. Cook
39854.629:	627	-0.009:	13	S. Cook
39859.622	629	-0.003	17	M. Baldwin
40178.733	757	-0.001	19	M. Baldwin
40380.672	838	+0.001	25	J. Bortle
40512.809	891	+0.008	20	M. Baldwin
40557.681	909	+0.005	24	M. Baldwin
40562.663	911	+0.001	22	M. Baldwin

J.D. hel. (2400000+)	E	O - C	n	Observer
XX Cephei				
39821.582	785	+0.005	9	M. Baldwin
40237.617	963	-0.003	22	J. Bortle
40473.660	1064	-0.028	12	L. Hazel
ZZ Cephei				
40528.668	5883	+0.008	22	M. Baldwin
EG Cephei				
40028.659	24052	-0.004	12	L. Hazel
40095.664	24175	+0.012	16	J. Bortle
40107.646	24197	+0.013	19	J. Bortle
40113.636	24208	+0.012	19	J. Bortle
40137.595	24252	+0.008	17	J. Bortle
40156.652	24287	+0.003	20	J. Bortle
40161.561	24296	+0.010	19	J. Bortle
40253.601	24465	+0.010	14	J. Bortle
40296.623	24544	+0.007	18	J. Bortle
40302.620	24555	+0.013	18	J. Bortle
40363.611	24667	+0.007	18	J. Bortle
40369.606	24678	+0.011	14	J. Bortle
40412.630	24757	+0.010	18	J. Bortle
40418.622	24768	+0.011	14	J. Bortle
40455.648	24836	+0.002	14	R. Monske
40456.733	24838	-0.001	15	R. Monske
40468.727	24860	+0.011	14	M. Baldwin
40473.623	24869	+0.006	9	L. Hazel
40491.603	24902	+0.013	10	J. Bortle
40528.632	24970	+0.008	11	M. Baldwin
40552.600	25014	+0.012	7	J. Bortle
EK Cephei				
39706.741	159	+0.001	14	S. Cook
XY Ceti				
39878.701	9454	-0.009	11	S. Cook
RZ Comae Berenices				
40323.588	16207	+0.001	19	J. Bortle
40324.598	16210	-0.005	21	J. Bortle
40338.638	16251.5	-0.012	17	J. Bortle
40346.597	16275	-0.008	18	J. Bortle
40347.617	16278	-0.005	20	J. Bortle
40348.631	16281	-0.006	19	J. Bortle
40369.621	16343	-0.003	15	J. Bortle
40380.625	16375.5	-0.001	14	J. Bortle

J.D. hel. (2400000+)	E	O - C	n	Observer
Y Cygni 4)				
40093.767	10199	-0.154	8	M. Baldwin
40129.703	10211	-0.174	13	M. Baldwin
40150.696:	10218	-0.155:	7	T. Cragg
40156.693	10220	-0.151	14	M. Baldwin
SW Cygni				
39640.669	1417	+0.066	20	L. Hazel
39704.708	1431	+0.084	25	L. Hazel
40079.715	1513	+0.105	16	L. Hazel
40454.685	1595	+0.089	12	L. Hazel
ZZ Cygni				
39679.744	29497	-0.028	19	L. Hazel
39701.747	29532	-0.027	15	L. Hazel
39703.637	29535	-0.023	15	L. Hazel
39725.634	29570	-0.028	16	L. Hazel
39764.611	29632	-0.025	13	W. Lowder
39786.611	29667	-0.026	7	W. Lowder
39982.740	29979	-0.026	15	L. Hazel
40028.635	30052	-0.020	11	L. Hazel
40038.692	30068	-0.021	13	L. Hazel
40060.693	30103	-0.021	12	L. Hazel
40145.555	30238	-0.023	15	L. Hazel
40160.640	30262	-0.025	19	J. Bortle
40363.689	30585	-0.019	17	J. Bortle
40380.658	30612	-0.023	16	J. Bortle
40446.660	30717	-0.026	13	R. Monske
40456.720	30733	-0.024	13	R. Monske
40466.778	30749	-0.023	10	M. Baldwin
40471.802	30757	-0.029	12	M. Baldwin
40473.685	30760	-0.031	14	L. Hazel
40478.711	30768	-0.034	10	L. Hazel
40512.664	30822	-0.027	12	M. Baldwin
40524.611	30841	-0.024	12	L. Hazel
BR Cygni				
40081.642	4970	+0.011	24	J. Bortle
40113.629	4994	+0.016	23	J. Bortle
40137.610	5012	+0.011	18	J. Bortle
40145.611	5018	+0.017	20	J. Bortle
40161.595	5030	+0.010	22	J. Bortle
40197.571	5057	+0.007	19	J. Bortle
40466.750	5259	+0.008	26	M. Baldwin
40470.751	5262	+0.012	23	M. Baldwin
V477 Cygni				
40525.613	3272	-0.007	10	L. Hazel

J.D. hel. (2400000+)	E	O - C	n	Observer
W Delphini 5)				
40459.296	4663	+0.099	26	M. Baldwin
TT Delphini				
40147.681	658	+0.026	10	M. Baldwin
40460.632	767	+0.028	22	D. Lucas
TY Delphini				
39701.717	9807	-0.005	17	M. Baldwin
39707.672	9812	-0.006	11	M. Baldwin
39757.698	9854	-0.008	11	M. Baldwin
40069.770	10116	-0.009	14	M. Baldwin
40081.672	10126	-0.018	15	L. Hazel
40087.626	10131	-0.020	12	L. Hazel
40112.655	10152	-0.004	19	J. Bortle
• 40118.613	10157	-0.002	19	J. Bortle
40143.598	10178	-0.030	11	L. Hazel
40411.631	10403	-0.001	14	J. Bortle
40443.788	10430	-0.003	18	M. Baldwin
40449.738	10435	-0.008	15	M. Baldwin
YY Delphini				
40455.728	1387	+0.013	15	R. Monske
40524.692	1474	-0.021	10	D. Lucas
FZ Delphini				
40094.746	11198	+0.004	15	M. Baldwin
40116.677	11226	+0.005	14	M. Baldwin
40145.650	11263	-0.001	12	D. Lucas
40156.616	11277	0.000	14	M. Baldwin
40416.640	11609	-0.003	11	D. Lucas
40466.771	11673	+0.003	18	M. Baldwin
40470.690	11678	+0.006	9	M. Baldwin
Z Draconis				
39686.685	4728	+0.001	19	M. Baldwin
39762.701	4784	0.000	20	M. Baldwin
39800.709	4812	0.000	16	M. Baldwin
39906.597	4890	+0.007	18	D. Livingston
39910.663	4893	+0.001	13	M. Baldwin
39918.804	4899	-0.003	23	M. Baldwin
39948.667	4921	-0.003	14	L. Hazel
39948.667	4921	-0.003	11	H. Blake
39948.669	4921	-0.001	17	F. Chapman
39948.670	4921	0.000	31	D. Livingston
39952.741	4924	-0.002	17	L. Hazel
39963.597	4932	-0.005	24	F. Chapman
39963.599	4932	-0.003	26	D. Livingston
39963.599	4932	-0.003	16	L. Hazel

J.D. hel. (2400000+)	E	O - C	n	Observer
Z Draconis				
40001.610	4960	-0.001	16	L. Hazel
40168.571	5083	-0.004	35	A. Dobkowski
40442.775	5285	-0.004	16	M. Baldwin
40457.709	5296	-0.001	14	M. Baldwin
TW Draconis				
40324.604	2293	-0.001	15	J. Bortle
40338.630	2298	-0.009	16	J. Bortle
40439.672	2334	-0.015	19	R. Monske
TZ Draconis				
40347.584	2813	-0.002	11	L. Hazel
UZ Draconis				
40363.607	6419	+0.007	13	J. Bortle
40376.650	6423	+0.005	15	J. Bortle
40513.632	6465	+0.012	19	J. Bortle
40557.650	6478.5	+0.003	17	M. Baldwin
AI Draconis				
39722.761	555	+0.007	14	S. Cook
40107.575	876	+0.002	16	J. Bortle
40108.768	877	-0.004	8	R. Nolthenius
40113.571	881	+0.004	19	J. Bortle
40113.571	881	+0.004	15	K. Simmons
40126.756:	892	+0.002:	10	R. Nolthenius
40313.779	1048	+0.011	18	R. Sweetsir
40337.752	1068	+0.007	16	R. Sweetsir
40427.653	1143	-0.003	21	J. Bortle
40439.643	1153	-0.001	15	R. Monske
40445.649	1158	+0.011	15	R. Monske
40469.620	1178	+0.005	16	R. Simkins
40469.622	1178	+0.007	14	K. Simmons
YY Eridani				
40200.638	20476.5	+0.001	19	J. Bortle
40208.679	20501.5	+0.004	18	J. Bortle
40232.624	20576	-0.002	18	J. Bortle
40233.586	20579	-0.004	19	J. Bortle
40237.613	20591.5	+0.004	19	J. Bortle
40556.691	21584	-0.003	11	M. Baldwin
AS Eridani				
40566.710	4515	-0.002	16	M. Baldwin
RW Geminorum				
40587.629	7777	+0.004	14	L. Hazel

J.D. hel. (2400000+)	E	O - C	n	Observer
SX Geminorum				
39922.607	15284	-0.011	14	L. Hazel
39948.577	15303	-0.011	15	L. Hazel

This work is sponsered by the American Assiciation of Variable Star Observers, with the writer as program coordinator. The reductions were made by the writer except where otherwise noted.

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1) Only the second half of the eclipse was observed. Data was fitted to observations of JD 2439701 to measure time of minimum.

2) Only the first half of the eclipse was observed. Data was fitted to M. Baldwin's observations of JD 2439701 to measure time of minimum.

3) Geocentric time of minimum determined by the observer. Heliocentric correction and O-C calculated by the writer.

4) In keeping with the introductory remarks only the linear elements were used in calculating the O-C residuals.

5) Time of minimum determined from observations of the last half of the eclipse of JD 2440449 and the first half of the eclipse of JD 2440468.

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Konkoly Observatory
Budapest
1973 May 21

THE LARGE PERIOD VARIATION IN SS CAM EXPLAINED

New UBV photoelectric photometry of the RS CVn-type eclipsing binary SS Cam, obtained during 1972 at Dyer Observatory and Kitt Peak National Observatory, provides support for the theory proposed by Hall (1972) to explain the large period variations which are experienced by the RS CVn-type binaries. In this theory the continuous back and forth period variation is explained as a result of continuous mass loss from an active (dark) region on the equator of the cool star which differential rotation forces to change its orientation in the binary system.

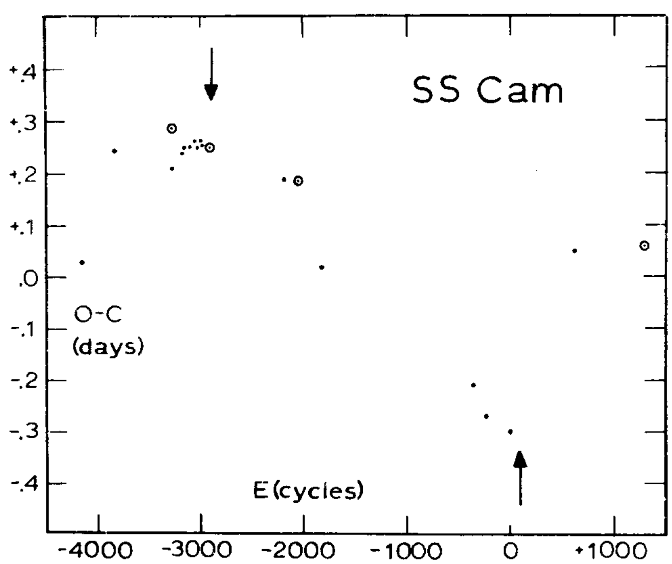
Our 1972 UBV photometry, which will be published elsewhere later, shows the minimum of the out-of-eclipse wave-like distortion to be located at orbital phase $P = 0\overset{P}{.}56$. The 1913-1915 visual observations of McDiarmid (1917, 1924) show the minimum of the wave at $P = 0\overset{P}{.}27$. If these two phases are plotted versus time and if the wave is assumed to have migrated towards decreasing orbital phase, as the theory requires, then we have a migration rate diagram similar to that constructed by Hall (1972, Figure 2) for RS CVn. From such a diagram we can deduce that the minimum of the wave was located at $P = 0\overset{P}{.}25$ around 1917 and at $P = 0\overset{P}{.}75$ around 1956.

The O - C diagram of SS Cam is plotted in this Bulletin, where the residuals have been computed with the ephemeris

$$JD\ (hel.)\ 2435223\overset{d}{.}580 + 4\overset{d}{.}82430\ E$$

of Kreiner (1971). The last point is the one based on our UBV photometry and corresponds to a primary minimum at JD (hel.) 2441456.634. The other points are based on times very kindly supplied to us by Dr. J.M. Kreiner of the Krakow Observatory. The circled points are normals representing several individual times.

The arrow pointing down is the time when the minimum of the wave was at $P = 0\overset{P}{.}25$ and the theory would predict that the mass-losing active region was on the trailing hemisphere and should be causing the maximum rate of period decrease. The arrow pointing up



is the time when the minimum of the wave was at $P = 0\overset{P}{.}75$ and the theory would predict the maximum rate of period <u>increase</u>. Within the limitations imposed by this less than ideal O - C diagram, we would say that the predictions of the theory are confirmed perfectly.

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May 10, 1973

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 797

Konkoly Observatory
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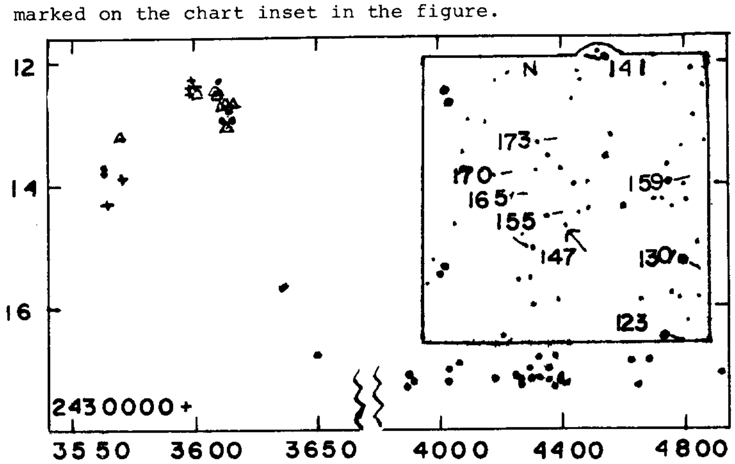
1973 May 24

A NOVA-LIKE VARIABLE STAR

The star (1900: $23^h44^m.0$, + $50°54'$) is Oklahoma Variable No.29. It was found in 1951 on plates taken in 1950. During the next four years, 26 plates were taken with the 25 cm reflector, exposed to show stars fainter than 17 m_{pg}.

Magnitudes of comparison stars were obtained from measures with a Cuffey type astrophotometer of 4 pg plate pairs with Selected Area 20 as standard, and 5 pr plates using an unpublished sequence for CS Cas, which is only 13' from the new variable. The pg magnitudes are marked on the chart inset in the figure.



Observations of OV29 and chart of surroundings (5' square).The vertical scale is for both pg and pr magnitudes. The symbols are: camera, pg: +; reflector, pg: •; pr: Δ.

The observations in the figure indicate a maximum near JD2433600, and an amplitude of 4.8 m_{pg}, from 12.3 to 17.1. The close agreement of pg and pr points in maximum shows that the star is blue.The points in minimum light are from estimates with an eyepice. One point,17.1m_{pg} at JD2435391.6, is beyond the limit of the figure.

It is probable that the variable is a U Gem type star. No trace of it could be seen on earlier plates on 241 nights from 1942 until the 1950 outburst, nor on 9 later nights down to October, 1958. Most of these had limiting magnitudes near 14.5, but a few near 16 m_{pg}.

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CONCERNING A SUSPECTED VARIABLE STAR IN M13

In 1964 Tsoo Yu-Hua of the Purple Mountain Observatory announced that he suspected two stars in the neighborhood of the globular cluster M13 to be low amplitude variables (reported in the Draft Reports of IAU General Assembly XIII,p.556). One of these stars, Savedoff A-18 (Savedoff 1956, Astron.J. 61, 254) is sufficiently close to the cluster that it could possibly be an outlying RR Lyrae member. This star has been denoted Variable 16 of the cluster in the Third Catalogue of Variable Stars in Globular Clusters (Sawyer Hogg 1972, preprint). If the variability and membership were confirmed the star would be of interest both because only a small number of RR Lyrae stars are known for M13, and because with a color index of -0.19 as found by Savedoff,which corresponds to approximately B-V = 0.0, the star would be unusually blue for a variable. This is of importance because the blue edge of the instability region for a cluster depends on the cluster's helium abundance.

As part of our investigation of the short period variables of M13 we have measured the brightness of Savedoff A-18 on the 57 blue plates of the cluster at our disposal. The measures were made with an iris photometer in relation to four nearby comparison stars. As a control, the non-variable star Savedoff A-328, which is of aproximately the same brightness as A-18, was also measured and magnitudes determined in the same manner as for the suspected variable. We find that during the three years covered by our plates the star A-18 did not vary within the accuracy of our measures, i.e. the variations if any were less than 0.15 mag. The standard deviation for our measures of A-18 with respect to the mean is $\pm$0.05mag., identical to the value found for the control star. In both cases the individual values are distributed in roughly Gaussian fashion about the mean value, whereas measures from the same plates of the confirmed low amplitude variable, Variable 7, have a distinctly non-Gaussian distribution. Thus, the present results taken together with the very blue color index indicate that the star is probably not variable.

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THE NON-EXISTENCE OF NOVA CARINAE 1970

Knigge (IBVS No.765 1973) has reported the appearance of a probable nova = BV 1543 Car from sky patrol plates taken with the 10-inch Metcalf telescope at Boyden Observatory, South Africa. His plate material shows a brightening of the star, from m_{pg}=15.2 to 12.4, between 1969 Mar. 23 and 1970 Feb. 7 and then a steady decrease in brightness back to m_{pg}=15.2 by late March 1970. From this material it was presumed that the variable was a nova and that the maximum had probably been missed occurring between the first two dates above. From spectrum plates available at this Observatory it is clear that this star is actually a long-period variable of spectral type M.

We have available five 10° objective-prism plates of this region obtained with the University of Michigan's Curtis Schmidt-type telescope situated at Cerro Tololo, Chile. The table below summarizes the data for these plates and the appearance of the variable; the dispersions are 108 Å mm^{-1} and 420 Å mm^{-1} at Hγ and Hα, respectively.

U.T. Date	Emulsion	Filter	Appearance
1968 May 28	IIa-O	-	fainter than plate limit ($m_{pg} \gtrsim 11.5$)
1970 Feb. 13	IIa-O	-	Hγ, δ emission; very faint TiO band heads
1970 Mar. 9	IIa-O	-	Hγ, δ very faint; no continuum
1971 Feb. 18	IIa-F	RG 1	fainter than plate limit ($m_r \gtrsim 12$)
1972 Mar. 21	098-02	RG 1	$m_r \sim 10$; type M4 or M5

That this long-period variable is, in fact, identical to BV 1543 Car is clear from comparison of the field with the chart given by Knigge. The emission lines on our February 1970 plate are of equal strength implying that the star was 0.2 to 0.3 phase past maximum at that time (Merrill, P.W.:"Spectra of Long-Period Variable Stars" p.53.)

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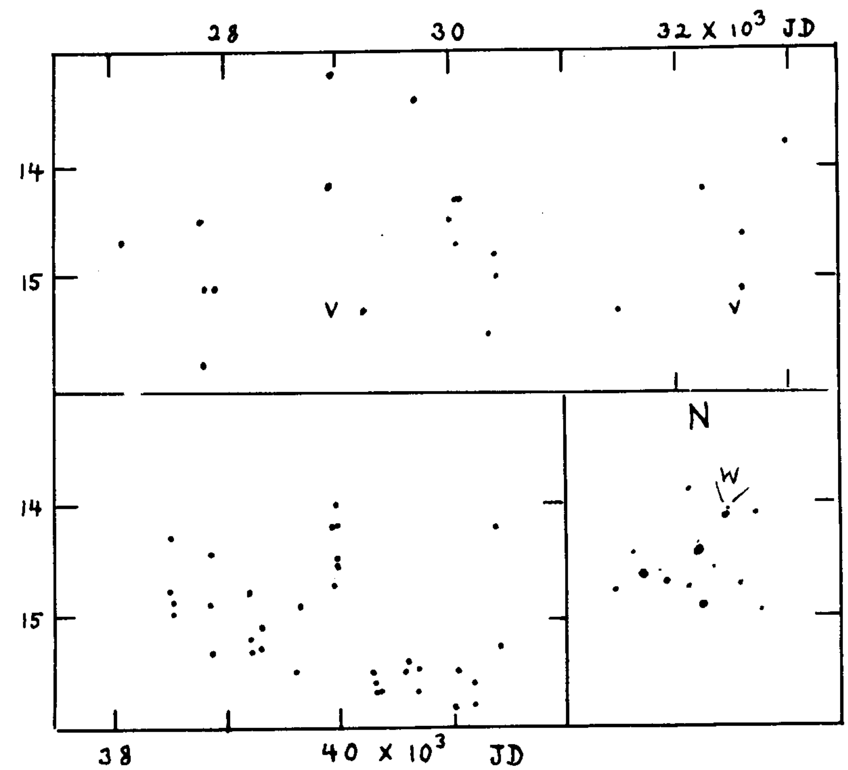
OBSERVATIONS OF W COMAE BERENICES

W Comae Berenices has tentatively been identified by Biraud (1971) as related to the radio source ON 231. At the suggestion of James Heasley at Yale, the variable star has been examined on the plates at the Maria Mitchell Observatory (7.5-inch Cooke triplet, scale 248" per mm), 90 plates taken in 1964 - 1972 reaching 14.3 mag pg or fainter; and on about 40 useful plates of the Harvard RH series (3-inch Ross-Fecker lens, scale 390" per mm) taken between 1933 and 1950.



The step estimates carried out by Sharon Beck, a Yale student, I have converted to approximate provisional magnitudes on the basis of the sequence in Selected Area 56. The plot of the observations suggests rapid and erratic changes. On three consecutive Harvard plates of April 1938 the variable was found at 14.2 mag on JD 28990, fainter than 15.3 on 28993, and 13.2 on 28994. The Nantucket plates reveal a maximum range from about 14.0 to 15.8.

W Com is probably quite similar to AP Lib, identified with the radio source PKS 1514-24, discussed in greater detail by Biraud.

22 May 1973

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Biraud, F. Nature, Vol.232, p.178, 1971.

V343 Ori - NEW ELEMENTS

V343 Ori is an eclipsing variable of the W UMa type. My elements published for the star in 1949, Acta Astron.ser. c, v.4,118, turned out to be incorrect. On the basis of 718 observations covering the period 1948 - 1960 I determined new mean elements:

$$\text{JD hel } 2433599.379 + 0\overset{d}{.}809123 \cdot E.$$

Cracow, May 14, 1973

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